ThinkPad 500

User's Guide

ThinkPad 500

User's Guide

Note

Before using this information and the product it supports, be sure to read the general information under Appendix C, "Product Warranties and Notices" on page C-1.

Second Edition (November 1993)

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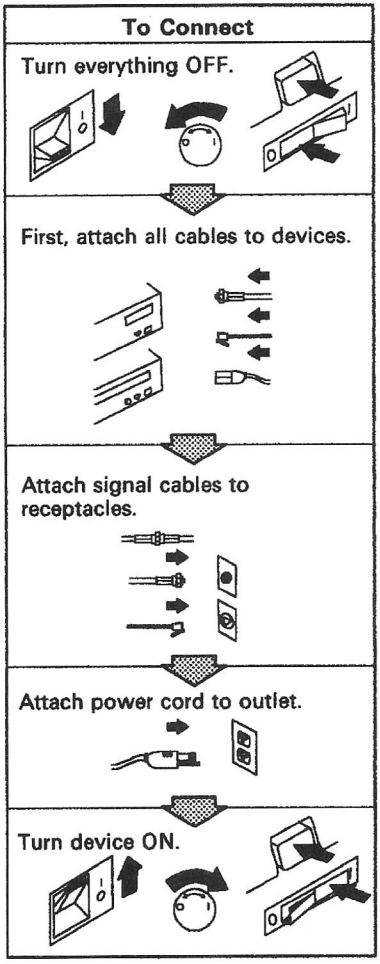
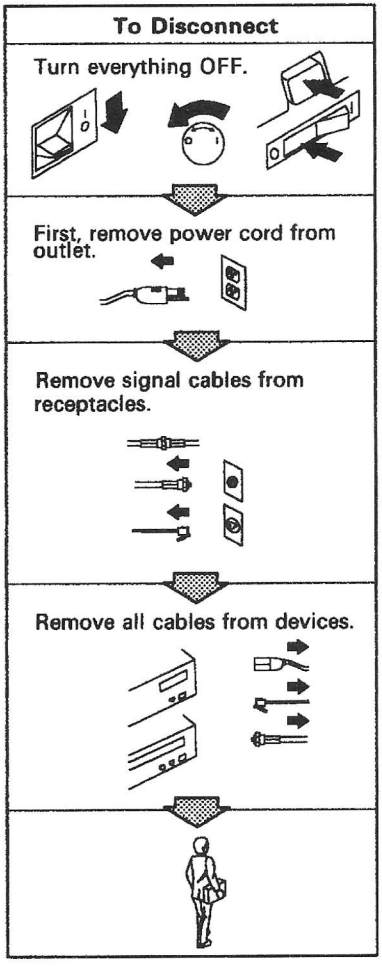
Electrical Safety Notice

DANGER:
Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly-grounded outlet.



Note: In the U.K., by law, the telephone cable must be connected after the power cord.



Note: In the U.K., by law, the power cord must be disconnected after the telephone line cable.

Chapter 1. Getting Started

Unpacking

Setting up your ThinkPad* 500 is easy.
Everything you need is in the box:

- Computer
- Diskette drive
- AC adapter
- Battery
- Diskette drive/serial cable
- Power cord
- Video adapter cable
- *IBM ThinkPad 500 User's Guide*

Save the packing materials in case you need to repack the computer for service or storage.

Before proceeding, be sure all equipment and documentation has been unpacked.

---

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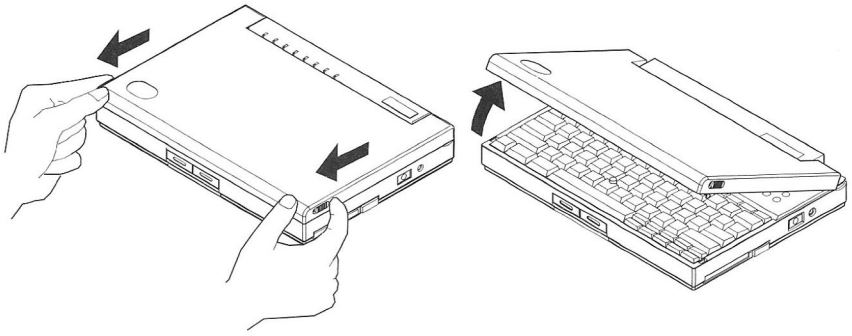
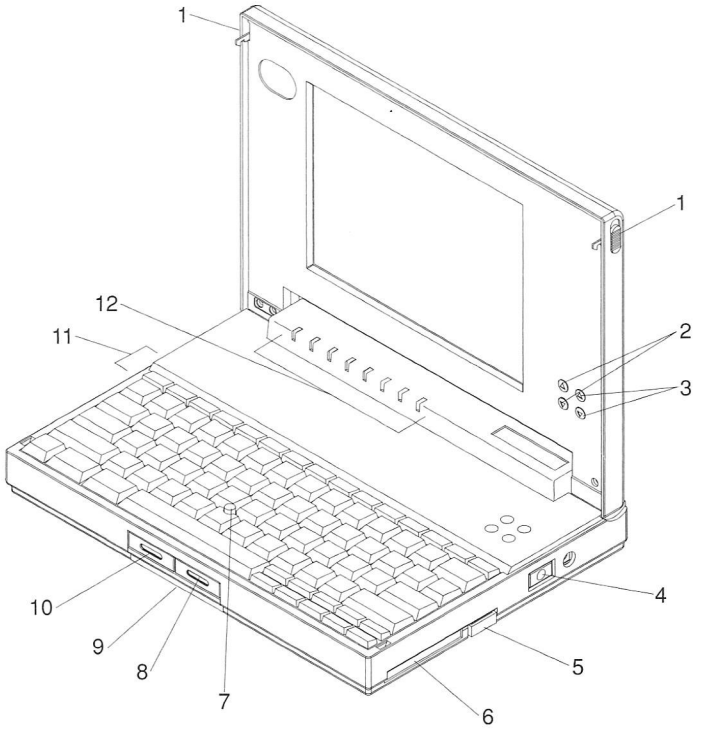
Opening

To open your computer, slide the latches forward on both sides of the computer to release the top cover. Lift the top cover as shown in the figure.



Note: Do not turn on the computer until instructed to do so.

ThinkPad 500 (Front View)

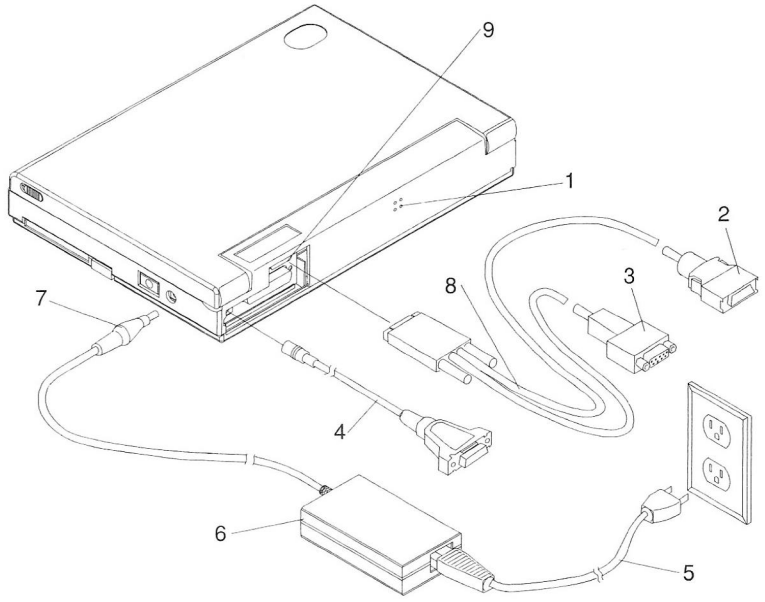


1	Top Cover Release Latches	7	TrackPoint II* Pointing Stick
2	Contrast Control Buttons	8	Right Mouse Button
3	Brightness Control Buttons	9	Memory Card Access Panel
4	Power Button	10	Left Mouse Button
5	PCMCIA** Eject Button	11	Battery
6	PCMCIA Slot	12	Status Indicators

* Trademark of International Business Machines Corporation.

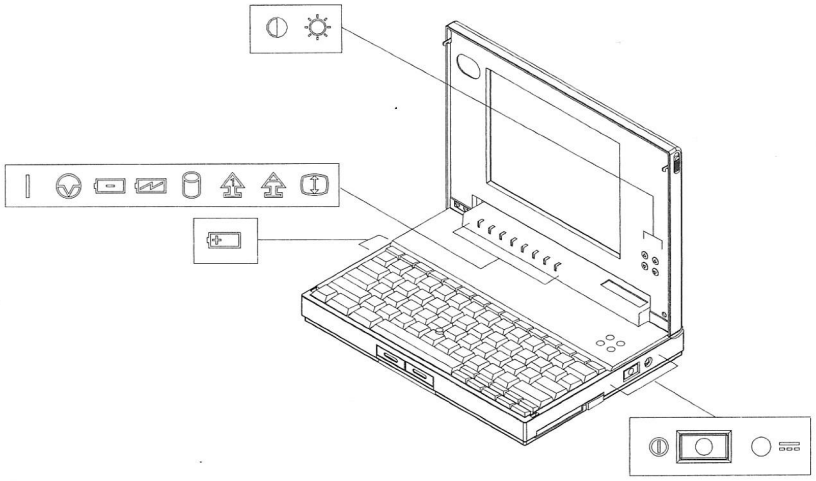
** Trademark of Personal Computer Memory Card International Association.

ThinkPad 500 (Rear View)



1	Speaker	6	AC Adapter
2	Diskette Drive Connector	7	AC Adapter Connector
3	Serial Connector	8	Dual Adapter Cable
4	External Video Adapter Cable	9	Parallel Connector
5	Power Cord		

ThinkPad 500 Icons



	Power On		Scroll Lock
	Suspend Mode		Battery
	Battery Low		Contrast
	Battery Charging		Brightness
	Hard Disk Drive		Power Button
	Num Lock		AC Adapter
	Cap Lock		

Turning On Your Computer

Before using your computer for the first time, install the battery and connect the AC adapter. The battery charge indicator on the status panel turns on to indicate that the battery is charging.

Note: When you connect your computer to the AC adapter for the first time, leave it connected for 24 hours to fully charge the main battery and the backup battery.

To turn on the computer, press the power button. The power button is a momentary contact switch. It may take a few seconds for the liquid crystal diode (LCD) to activate.

Your computer comes with an introductory program (the INTRO program) that begins when you turn on your computer for the first time. This program provides a brief description of your computer's features and lets you backup the utilities that are on the computer's hard disk. When you use the backup process, the utilities are copied onto the 3.5-inch diskette that you inserted into the diskette drive. It is recommended that you create the backup copy while using the INTRO program. When you have finished, place the diskette with the backup copy in a safe place for future use. You will need the backup if you decide to change the amount of memory in your computer, or if you format, erase, or reconfigure your hard disk.

The README file contains important information about your computer. Be sure to read it as you use the INTRO program or type the command README at the DOS prompt. It contains information on personalization, getting the most out of your battery, what to do if you install Microsoft** Windows**, and much more.

** Trademark of Microsoft Corporation.

You can run the introductory program at any time by typing INTRO at the DOS prompt and pressing Enter.

Your computer is configured with specific operating information stored in memory. Because the back-up battery may have discharged during shipment, the information may have been lost. If this has occurred, the following messages are displayed:

```
Real time clock failure
Time-of-day not set - run SETUP program
Invalid configuration information - please run SETUP program
Press the F1 key to continue, F2 to run the setup utility
```

Pressing F1 causes your computer to try to restart. Pressing F2 displays the Setup screen with a message stating the cause of the error and the action required.

Refer to Chapter 2, "Setup" on page 2-1 for step-by-step instructions to set the required parameters.

Restoring Your Utilities

If you ever need to copy the ThinkPad 500 Utilities back onto the hard disk, follow these steps:

1. Insert your backup diskette into the diskette drive.
2. At the DOS prompt, type a:, then press Enter.
3. Type RESTUTLS, then press Enter.

The Restore ThinkPad 500 Utilities Screen is displayed.

Follow the directions on screen to copy the ThinkPad 500 Utilities back onto the hard disk.

You will have the option to restore the ThinkPad 500 Utilities to a DOS, DOS with Windows, or OS/2 environment. This will make appropriate changes to AUTOEXEC.BAT, CONFIG.SYS, and SYSTEM.INI (in the case of Windows).

Your Battery Pack

Your computer comes with a rechargeable battery pack. You can use the battery pack to supply power to your computer when it is not connected to AC power. The operating time of a fully charged battery pack depends on your applications, system configuration, and power management settings.

Note: It is normal for the battery pack to feel warm immediately after charging.

Using the AC Adapter

To charge the battery pack:

1. Install the battery pack in your computer.
2. Connect the computer, AC adapter, and power cord.

After the AC adapter is connected, the battery pack will begin charging. The battery charging indicator light on the machine will be on whenever the unit is connected to AC power even though the battery might have completed charging. The battery will fully charge in about 1 hour if the computer is turned off while charging or about 2.5 hours if the computer is on. The auto-switching AC adapter can be used with 110 V ac or 220 V ac.

Warning: Use only the AC adapter that comes with your computer. Use of any other AC adapter might damage the battery and the computer.

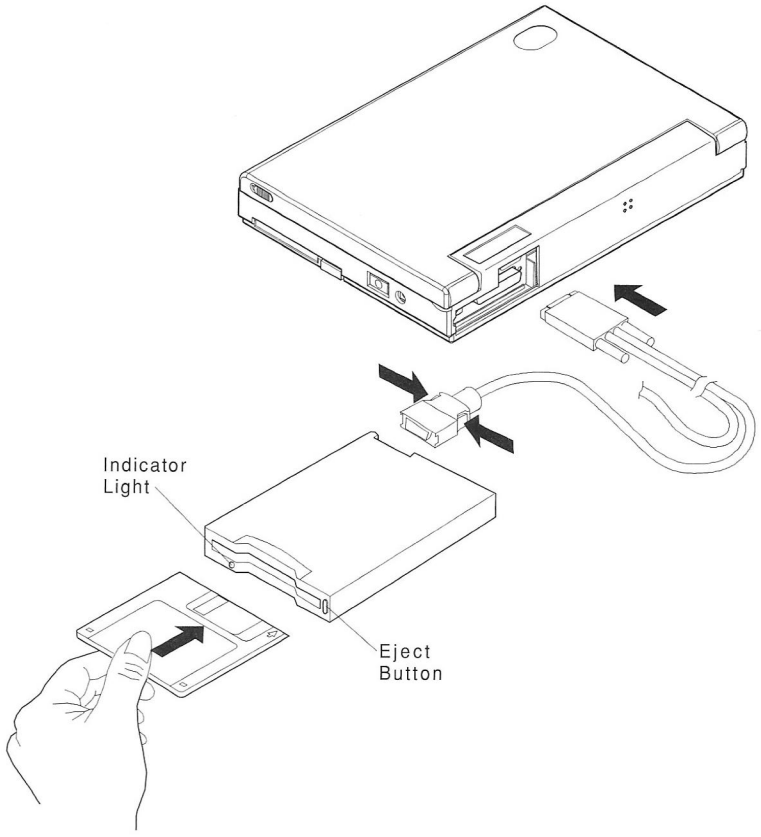
For more information about your battery, see "Batteries" on page 4-18.

Using the External Diskette Drive

Before you use the external diskette drive, connect the drive to your computer using the dual adapter cable. To connect the cable to the external diskette drive, follow these steps. Refer to the figure on the next page if you need help.

Note: You do not have to turn off the computer to connect the external diskette drive.

1. Make sure there is no diskette in the external diskette drive.
2. Press in on the two latches on the diskette drive connector.
3. Connect the cable to the external diskette drive.
4. When the cable is connected, release the two latches on the diskette drive connector.
5. Connect the dual adapter cable to the back of your computer. Turn the two screws so the connector is secure — do not turn the screws too tightly.



To install an operating system or load software, place the diskette with its label side up into the diskette drive slot. Push the diskette in until you hear it click into place. The indicator light turns on when a diskette is accessed by the computer. To remove the diskette, press the eject button next to the drive slot.

Note: Do not transport your computer with a diskette in the diskette drive. Damage to the diskette drive may result.

Chapter 2. Setup

The Setup program allows you to specify how the computer operates. Many features of your computer can be changed from the factory default setting with the Setup program. There are two Setup configurations:

- **Standard System Parameters** — You can specify standard system parameters, such as time, date, password, diskette drive, hard disk, cache, and parallel port.
- **Power Management** — You can specify various power management parameters, such as doze, auto suspend, suspend mode, power switch, auto hibernate, LCD display, hard disk timeout, serial and parallel port, resume modem ring, alarm clock wakeup, and microprocessor (CPU) speed.

If you make any changes in the configuration, be sure to save the new configuration when you exit the Setup program. Otherwise, all your changes will be lost.

Entering Setup

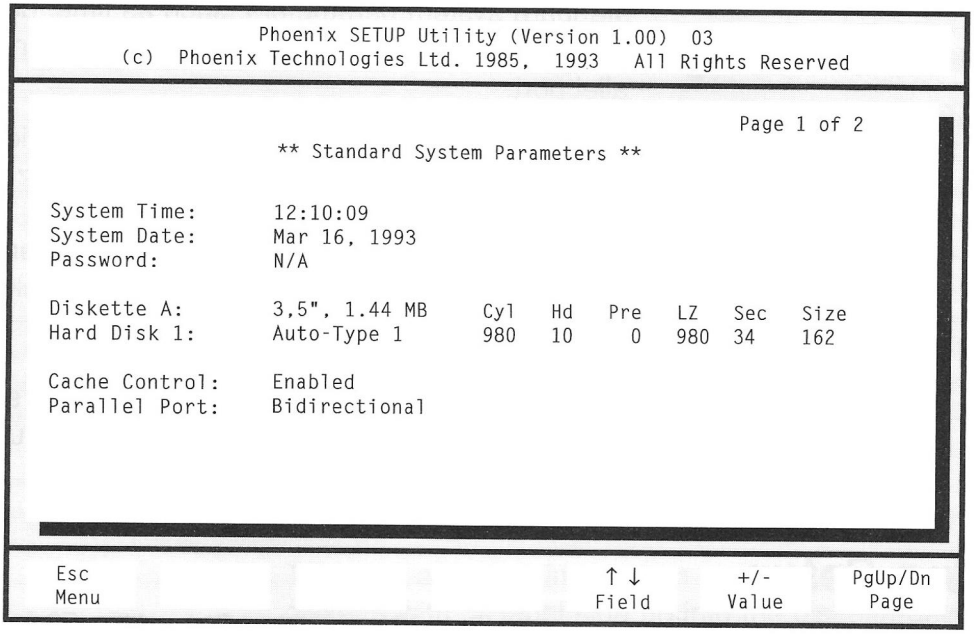
You can enter Setup by pressing Ctrl + Alt + F3 from the DOS prompt. This combination gives you the Standard System Parameters.

You can press Escape to leave Setup at any time. Please read "Escape Menus" on page 2-13 for information using this function.

Standard System Parameters

The System Parameters specified from the Standard System Parameters Setup are shown in the figure.

Note: The Standard System Parameters shown in this figure may not correspond exactly to your computer configuration.



The following describes the Setup function keys:

Esc Allows you to escape from the Setup menu. When you press Escape (Esc), an overlay menu is displayed. Please read "Escape Menus" on page 2-13 for information using this feature.

↑↓ Allows you to move between menu items with the ↑ or ↓ keys. As you move through the menu items, the selected item is highlighted.

+/– Allows you to select a value for the highlighted item using the plus and minus (+/–) keys or the spacebar to scroll through a list of entries. Some items require direct keyboard input.

Note: The + key moves forward through the selection list while the – key moves backward. If there are only two selections in the list, all three of the keys (+, –, and spacebar) toggle (move back and forth) between the selections.

PgUp/Dn Allows you to move between pages using the page up and page down keys.

Setup Options

The Setup options are described in detail in the following pages.

System Time

Selection: hh:mm:ss

Description: The current system time is displayed in hours, minutes, and seconds. You may set the hours and minutes to any time using the forward or backward scroll options. You do not have full control of the seconds but may clear this field by using the either the + or – keys. The time can also be set for a 24-hour clock.

System Date

Selection: month, day, year

Description: Specifies the current system date as month, day, year. Each of the three fields is selected separately. Select the month (three-character field), day of the month, and the year for the system date. Type the date as shown in the example: Jun 29, 1993.

Password

Selection: N/A | Enabled

Description: Allows you to initialize (enable) or change the password (Power-On Self Test (POST) Security Code). When this field is selected the following message is displayed:

```
WARNING! Changes to this field will alter your
POST Security Code.  Press ENTER to continue
or any other key to exit without changes.
```

If you press Enter, you are guided through a series of procedures to change the password.

Diskette A

Selection: 3.5", 1.44MB

Description: The computer is preset to 3.5", 1.44MB. The diskette drive is not built into the computer, but an external drive can be connected through a special port located on the back.

Hard Disk 1

Selection: User – Type 1 | Auto–Type 1

Description: The computer is preset with information about the hard disk. However, if the information is lost, an error message is displayed instructing you to go into Setup. Once in Setup, select Auto 1. If Auto 1 fails, then you must select User 1.

Drive type Auto 1 instructs the computer to automatically detect the size and configuration of the disk drive.

The User 1 drive is provided as an open drive type. You may specify the drive information. This option is needed only if Auto 1 fails. Read "Disk Drives" on page 4-5 for more information.

Cache Control

Selection: Enabled | Disabled

Description: When enabled, this feature allows the computer to use the 16KB of cache memory within the IBM 486SLC2 50/25 microprocessor for temporary storage of data. This provides for faster execution time and higher performance. When disabled, this feature is unavailable.

Parallel Port

Selection: Unidirectional | Bidirectional

Description: Configures the parallel port as unidirectional (AT*) or bidirectional (PS/2*). The device connected to the port determines how this option should be set.

The DOS device driver, EPP2.EXE, is provided to support the Enhanced Parallel Port (EPP) feature. Read "EPP2" on page 5-5 for more information about EPP2.EXE. No change to this Setup option is required to use EPP2.EXE. EPP allows for high speed data transfers to external devices supporting this feature.

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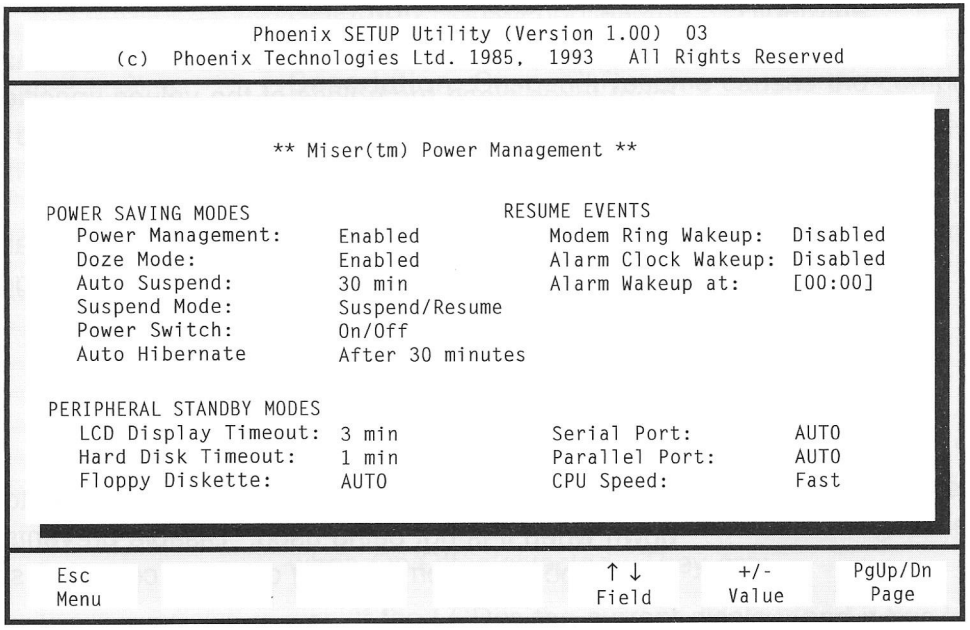
Power Management Setup

Power Management plays a major role in reducing power consumption and increasing the operating time of the battery. The Power Management Setup allows you to specify various options to take advantage of this feature.

Power Management Setup can be entered anytime after the computer has been started by pressing Func + F3.

The Power Management Setup screen with default values is shown in the following figure.



Note: Unless specifically noted, all Power Management features are only available when Power Management is enabled. However, suspend/resume and hibernation features are always available by using the special function keys (hot keys).

The following pages describe these power management fields in detail.

Note: Before you use any of these power saving features, read the "Precautions" on page 3-5.

Power Management

Selection: Disabled | Enabled

Description: If Disabled is selected, no power management takes place regardless of the values specified for the Power Management features. Selecting Enabled activates all of the Power Management features for the computer.

Suspend and Hibernate functions are always available to suspend the computer, even when Power Management is disabled by using the special function keys.

Doze Mode

Selection: Enabled | Disabled

Description: Enable allows the microprocessor to slow down when it is not being used. Disable prevents the microprocessor from slowing down (except to suspend).

Auto Suspend

Selection: Disabled | 2 to 30 minutes in 2 minute increments.

Description: If a time is selected, the timer begins when the computer is idle. If the system remains idle for the specified amount of time, it is placed into a Suspend state. When the computer is in a Suspend state, a resume event causes the computer to resume normal operation. Read "Using Suspend Mode" on page 3-2 for a description of resume events.

Suspend Mode

Selection: Suspend/Resume | Hibernate

Description: Suspend/Resume causes the computer to suspend and resume normally. Hibernate causes the computer state to be saved to disk and power to be turned off. To return from Hibernate state, the power button must be turned off and on again. Read "Suspend Mode" on page 3-1 for more information.

Power Switch

Selection: On/Off | Suspend Mode

Description: Selecting On/Off causes the power button to work as a normal on/off switch. However, there are two situations that keep the computer from being turned off when On/Off is selected. They are:

- If the LCD is the current display, and it has been turned off as a result of the LCD timeout option. When the LCD is turned off and you press the power button, the display is turned on. You can then press the power button to turn the computer off.
- If the computer is in a Suspend state, pressing the power button places the computer back to normal operation. You can then press the power button to turn the computer off.

If Suspend/Resume is selected, pressing the power button places the computer in a Suspend or Hibernate state, depending on the setting made for Suspend Mode. When the power button is pressed again, the computer resumes normal operation.

If Power Switch is set to Suspend/Resume and you want to turn the power off to the computer using the power button, you can enter the Power Management Setup screen by pressing Func + F3 and change the Power Switch field to On/Off.

Auto Hibernate

Selection: Disabled | After 30 Minutes

Description: If After 30 Minutes is selected, the timer begins when the computer enters the Suspend state. If the computer remains idle for 30 minutes, it is placed into a Hibernate state. This applies only if the Suspend Mode is set to Suspend/Resume.

LCD Display Timeout

Selection: Disabled | 10 seconds to 1 minute in 10 second increments, 1 to 10 minutes in 1 minute increments

Description: If LCD Display Timeout is disabled, the LCD display remains on at all times. If a timeout value is specified, the LCD display is turned on and off based on keyboard or TrackPoint II pointing stick activity.

Hard Disk Timeout

Selection: Disabled | 1 to 10 minutes in 1 minute increments, 10 to 20 minutes in 2 minute increments

Description: Disabled allows the drive to remain active at all times. If there is no hard disk access for the time specified, the hard disk motor slows down to save power, then resumes normal speed on the next access.

Diskette

Selection: AUTO | ON

Description: AUTO enables automatic Diskette power management and the power to the drive turns off when it is not active. Any access of the drive turns the power back on. ON disables Diskette power management and the power to the drive stays on.

Note: If you have problems installing OS/2* or other software, set the Diskette selection to ON during installation. When installation is complete, you can reset the Diskette selection to AUTO for automatic power management.

Serial Port

Selection: AUTO | OFF

Description: AUTO enables automatic Serial Port power management and power to the port turns off when it is not active. Any access of the port turns the power back on. OFF disables Serial Port power management and the power to the port stays on.

Note: Although the computer has a serial port, the serial port connector is not available directly on the computer. The serial connector and the diskette drive connector use the same port on the back of the computer. These two connectors are attached to the dual adapter cable connector that plugs into this port.

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Parallel Port

Selection: AUTO | OFF

Description: Selecting AUTO causes the parallel port to turn off when not active. Any access of the port turns the power back on. Selecting OFF causes the parallel port to remain on at all times.

CPU Speed

Selection: Fast | Medium | Slow

Description: Determines computer operating speed.

- Fast — full speed for the microprocessor
- Medium — ¼ of full speed
- Slow — ⅛ of full speed

Modem Ring Wakeup

Selection: Disabled | Enabled

Description: This option is available only with a PCMCIA modem card. With this feature enabled, the computer resumes normal operation when a call arrives at the modem port.

Alarm Clock Wakeup

Selection: Disabled | Enabled

Description: With this feature enabled, the computer resumes normal operation at the time specified by Alarm Wakeup At.

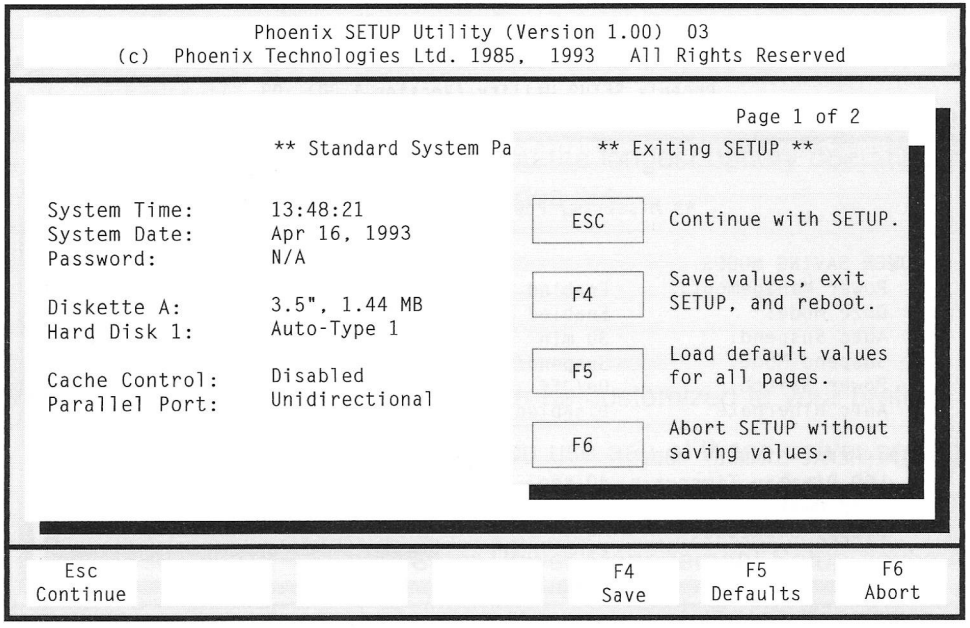
Alarm Wakeup At

Selection: hh:mm

Description: With Alarm Clock Wakeup enabled, you can specify the time for the computer to resume normal operation.

Escape Menus

There are two Escape menus provided in Setup. The first menu shown is the Escape menu for the Standard System Parameters.



The keys used with the Escape menu are as follows:

Esc Returns to Setup.

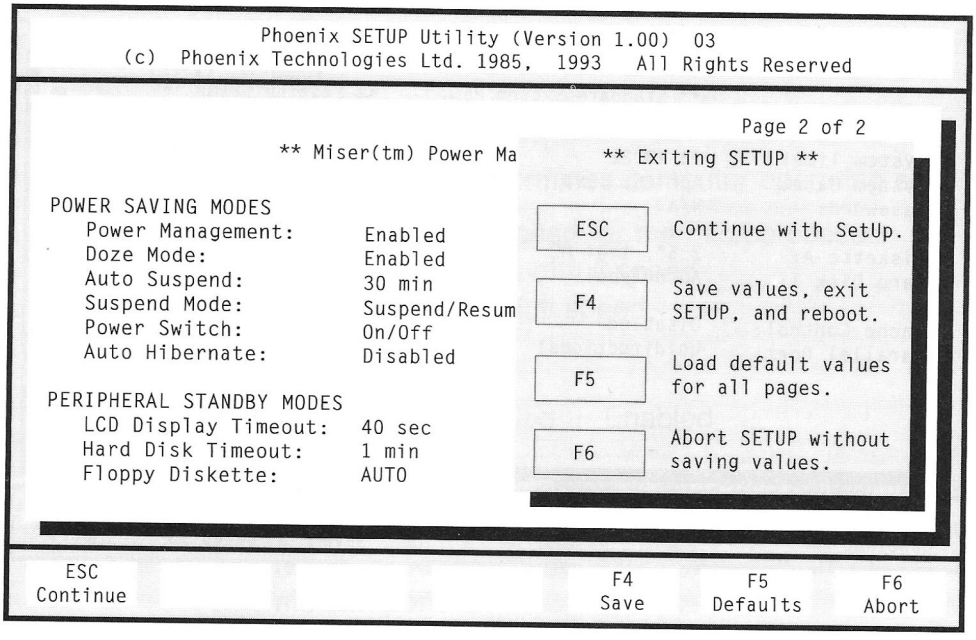
F4 Saves the values set in Setup and restarts the computer.

F5 Provides a means to re-initialize the Setup default values. This is used to return the computer to a known configuration.

F6 Exits Setup. If Setup was started from DOS, the computer returns to the DOS prompt. If Setup was started because of a memory configuration error,

the computer continues to start but Setup values are not saved.

The second menu shown is the Escape menu for Power Management.



The keys used with the Escape menu are as follows:

Esc Returns to Power Management Setup.

F4 Saves the values and takes effect immediately.

F5 Saves the values and takes effect immediately. In addition, these values become the startup defaults for the computer.

F6 Exits Setup. If Setup was started from DOS, the computer returns to the DOS prompt.

Chapter 3. Power Management Modes

Overview

Your computer uses three unique power management modes to give you the longest battery operating time possible. These modes are:

- Doze
- Suspend
- Hibernate

These modes can be customized to your preference.

Note: Before you use any of these power saving features, read "Precautions" on page 3-5.

You can enter Power Management Setup anytime after the computer has been started by pressing Func + F3.

Doze Mode

When enabled, Doze mode reduces the speed of the microprocessor when computer power is not necessary, such as between keystrokes. This feature helps extend the life of the battery. When Doze mode is disabled, the microprocessor always runs at full speed, which reduces the life of the battery.

Suspend Mode

Suspend mode is used typically for pausing your computer for short periods of time. Your computer enters and exits suspend mode almost instantly with no loss of data.

Use Suspend mode to save battery life for those times when you want to take a break or just think for a few minutes. Suspend mode can also be used to hide sensitive material on the screen without quitting the program.

Note: If you have a serial device, some computer functions may be changed. Some serial devices generate periodic interrupts. An interrupt from a serial device causes the computer to exit Suspend mode. Refer to your serial device documentation to determine if the serial device generates periodic interrupts.

How It Works

In Suspend mode, most of the computer's elements, such as the microprocessor, video, and hard disk drive, are powered down to conserve battery power. Any program that was running when Suspend mode began can be reentered at the same point with all data saved. The computer can maintain Suspend mode for up to 75 hours on a fully charged battery.

Using Suspend Mode

If Suspend mode is set to Suspend/Resume in Setup, the computer will **enter** Suspend mode by one of these methods:

- Auto Suspend timeout is reached (timeout is determined in Setup and can be set between 2 minutes and 30 minutes)
- Func + F4 key combination is pressed
- Top cover is closed
- Power button is pressed (if Power Switch is configured as Suspend/Resume in Setup)

The computer **resumes** from Suspend mode if one of the following Resume events occur:

- Computer detects keyboard activity
- Top cover is opened
- Power button is pressed (if Power Switch is configured as Suspend/Resume in Setup)
- Alarm clock is enabled and alarm wakeup time is reached
- PCMCIA modem, if installed, receives an incoming ring signal

Hibernate Mode

Hibernate mode is usually used for longer pauses in battery pack operation and can be considered an alternative to turning the computer off. For example, you can use Hibernate mode when you want to stop working for the night but want to begin in the morning where you left off. You can also use it to change the battery pack and resume where you left off.

Note: The PHDISK utility must be used to prepare the disk before the Hibernate feature is operational. Your computer is shipped with the disk prepared using PHDISK. You will use this only if your hard disk needs reformatting or if you add more RAM memory through the memory card access panel. Read Chapter 5, "Utilities" on page 5-1 for more information.

If you use a serial device or a PCMCIA card, some computer functions may be changed. When you resume from Hibernate mode, any serial device or PCMCIA card that receives power from the computer will no longer be configured and will not be recognized. Any serial device or PCMCIA card that has its own power source will be fully operational.

How It Works

When the computer enters Hibernate mode, all data is saved to the hard disk drive and the computer is shut off. Any program that was running when Hibernate began is re-entered at the same point with all of the data saved. The computer can maintain Hibernate mode for up to three months on a fully charged battery.

Full operation of the computer can be resumed by turning the computer on by pressing the power button once.

Using Hibernate Mode

Hibernate mode can be initiated only after the computer has been properly configured. To properly configure your computer, set Suspend mode to Hibernate.

Hibernate mode can be entered four ways:

1. Press Func + F12 (active regardless of settings made in Power Management).
2. Close the LCD cover (applies only if Suspend mode is set to Hibernate in Setup).
3. Auto Hibernate time is reached.
4. Battery pack is discharged to critical level (applies only if Auto Hibernate is set to After 30 Minutes in Setup). See "Low Battery Warning" on page 4-20.

Press the power button to return from Hibernate mode to normal operations. If you were running a program when the computer entered Hibernate mode, the program is re-entered at the same point.

Precautions

Before you use the power saving features described in this chapter, be sure to read and observe the following precautions:

- If you enter Suspend or Hibernate mode with a diskette inserted in the diskette drive, the same diskette must be placed back in the drive before attempting to resume normal operations.
- If you enter Suspend or Hibernate mode with a PCMCIA card inserted in the PCMCIA slot, the same PCMCIA card must be placed back in the slot before attempting to resume normal operations.

  Hibernate mode does not save/restore the status of PCMCIA cards. When you resume normal operations from Hibernate mode, the PCMCIA card is no longer configured and will not be recognized.
- If you are connected to a Local Area Network (LAN) that periodically polls for station activity, your connection may be terminated while the computer is in Suspend or Hibernate mode. Any further attempt to access the network results in a brief delay where the computer appears to be locked (up to 1 minute, depending on the network). After the delay, an error message is displayed. Follow the directions provided on the screen to restore operation.

  Any software program that was running over a LAN is not re-entered when you resume normal operations from Hibernate or Suspend modes.

Chapter 4. Features

Key Features

The heart of your computer is an IBM 80486SLC2 50/25 MHz high-performance microprocessor with built-in power management circuitry. In addition to the performance, your computer offers many other standard features listed below and described in this chapter.

- Power Management
- Memory
- Video
- Disk Drives
- PCMCIA Connectivity
- Security
- Audio
- Enhanced Parallel Port
- Keyboard
- TrackPoint II Pointing Stick
- Batteries

Appendix A, "Specifications" on page A-1 contains more detailed information about these features.

Power Management

This built-in feature increases battery life by switching clock rates and turning off circuits that are not being used. Three modes conserve battery power:

- Doze
- Suspend
- Hibernate

These modes can be customized to suit your preference.

Read Chapter 3, "Power Management Modes" on page 3-1 for more information.

Memory

Standard Memory

Your computer comes standard with the following:

RAM — 4MB Random Access Memory (RAM) memory. You can expand the memory up to 12MB using 4MB and 8MB memory expansion modules. Contact your place of purchase for more information.

Cache — 16KB cache memory inside the 80486SLC2 25/50 microprocessor. Cache is very fast memory that is used for temporary storage of data for direct access by the microprocessor.

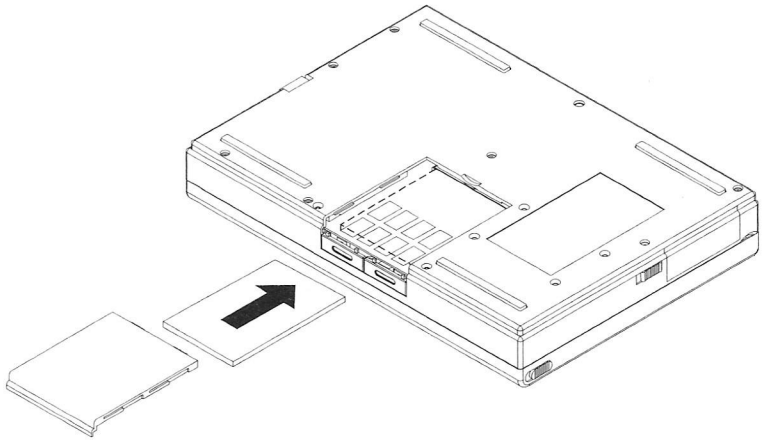
ROM — 128KB Read-Only Memory (ROM) that stores BIOS, video, Power Management, Setup program, and Display program code. The information stored in ROM is transferred to Random Access Memory (RAM) when the computer is turned on.

CMOS — 128 bytes of Complimentary Metal-Oxide Semi-conductors (CMOS) static RAM store Setup parameters.

Video Memory — 512KB of Video RAM.

Additional Memory

Your computer offers the ability to run large programs more efficiently by adding more RAM memory through the access panel, as shown in the figure. Additional memory can be purchased separately.



After you have installed the additional memory, you need to run PHDISK to enable Hibernate. Refer to "PHDISK" on page 5-6 and "Hibernate Mode" on page 3-3 for more information.

Video

Your computer has the following:

LCD Display — A 7.4-inch diagonal, 640 x 480 resolution monochrome display that is Video Graphics Array (VGA) compatible. It is a transmissive backlit LCD that supports 64 shades of gray. Backlighting makes the display easy to read.

Contrast Control Buttons — These buttons allow you to adjust the contrast of your LCD display.

Brightness Control Buttons — These buttons allow you to adjust the brightness of your LCD display. Reducing brightness saves power and increases the operating time of your battery. Reducing the brightness to the minimum turns the backlighting off for ease of use under bright lights or in daylight.

Video Memory — 512KB of Video RAM.

Video Adapter Cable — Allows you to attach an external VGA or Super Video Graphics Array (SVGA) display with resolution up to 800 x 600. You can use either the LCD, CRT, or both displays simultaneously.

For more information on how to use the video choices, see "Func + F7 (CRT/LCD)" on page 4-13 and "SIMUL" on page 5-3.

Disk Drives

Your computer comes with a hard disk drive and a diskette drive.

Hard Disk Drive — There are two types of hard disk drives available with your computer. Your computer comes with either a 85MB or 170MB 2.5-inch Integrated Drive Electronics (IDE) hard disk drive. Both types have the auto-park feature that allows you to move your computer without damaging your hard disk drive.

Note: Some disk checking utilities might report the actual capacity of the hard disk drive as slightly less than capacity.

Your computer has been configured so that 4MB of your hard disk drive is reserved for Hibernation mode. This was configured using the PHDISK.EXE utility. For more information on the PHDISK.EXE utility, read "PHDISK" on page 5-6.

The following hard disk drive information is displayed on the Setup screen:

- Cylinders
- Number of Heads
- Precompensation
- Landing zone
- Number of sectors per tracks
- Disk capacity (size)

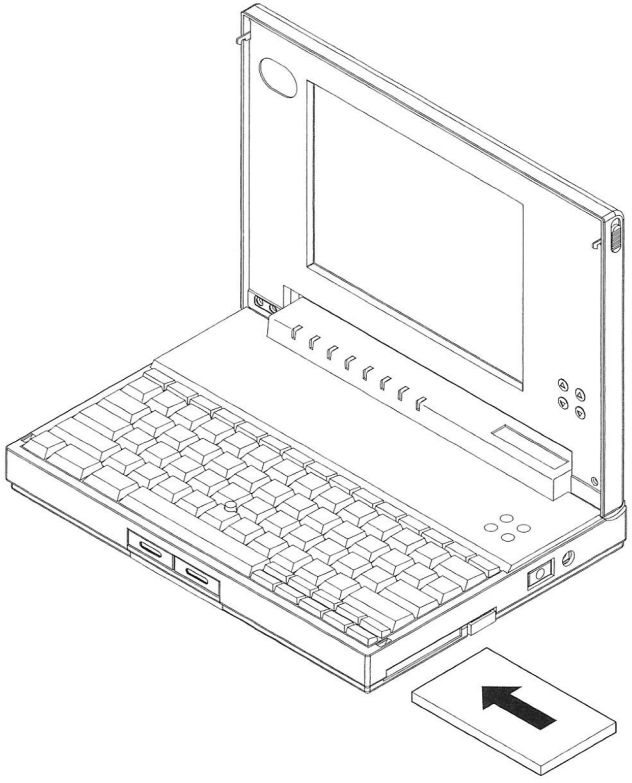
If you have to reset your parameters for any reason, type the information that applies to your hard disk drive as shown.

	Cyl	Hd	Pre	LZ	Sec	Size
85MB	672	10			25	86
170MB	980	10	0	980	34	162

Diskette Drive — One 3.5-inch 1.44MB externally attached slimline diskette drive.

PCMCIA Connectivity

The PCMCIA Type II slot offers connectivity to a wide variety of options by inserting a PCMCIA card. See "PCM Plus PC Card Support" on page 5-35 for a list of PCMCIA cards currently supported by IBM PC DOS for use with your computer. PC DOS has been preloaded on the hard disk.



See your place of purchase for PCMCIA cards that are compatible with your computer.

Security

Password protection is provided to help prevent data loss and unauthorized access to your computer. See "Password" on page 2-4 for more information on setting the password.

Audio

Single channel audio is provided through a miniature speaker located at the back of the computer.

Enhanced Parallel Port

The high-performance Enhanced Parallel Port (EPP) can perform high-speed bidirectional data transfers to external devices supporting EPP. Your computer has been configured to support this enhanced interface. Before you can use this feature, you must install the EPP2.EXE driver. Read Chapter 5, "Utilities" on page 5-1 for more information on the EPP feature. See "EPP2" on page 5-5 for a detailed discussion about EPP2.EXE.

Keyboard

The keyboard provides all the functions of a full-sized keyboard. To emulate a full-sized keyboard, many of the keys on your keyboard serve more than one purpose. Various uses for each key are indicated on the key top.

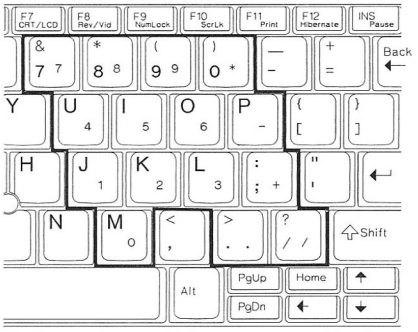
Alphanumeric Keys

The alphanumeric key group has character and control keys that resemble a typewriter keyboard.

Numeric Keypad

The numeric keypad function is part of the keyboard, enabling some keys on the keyboard to work as if they were a separate 15-key keypad.

The keys shown in the figure are defined as the numeric keypad.



Using the Numeric Keypad: You can enable and disable the numeric keypad by pressing Func + F9. When enabled, the Numeric Lock indicator turns on and the keys are switched to a numeric keypad. In addition, special symbols on the keypad can be used to perform certain functions. These symbols are located on the lower right corner of the keys and include:

- * for multiplication
- – for subtraction
- + for addition
- . for decimal
- / for division

To leave the numeric keypad, press Func + F9 again.

Key Functions

The following is a list of keys and the actions they usually perform. The action of these keys depends on the software you are using since some software programs often alter the logic function of the keys. In addition, some of the keys are often used in combination with other keys to perform different functions specific to the software program. Please refer to your software program's documentation for additional information.

SHIFT — When pressed in conjunction with other numeric and character keys, this key enters a character in uppercase or enters the symbol printed on the upper half of the key. If Caps Lock is on (Caps Lock icon is on) pressing the Shift key while typing produces lowercase characters.

CAPS LOCK — This key lets you enter all characters as uppercase characters. Press this key to lock in capital letters, press it again to unlock capital letters. If Caps Lock is on (Caps Lock icon is on), pressing the Shift key while typing produces lowercase characters.

TAB — This key moves the cursor to the next tab setting or field.

SPACEBAR — When typing commands and data, use the Spacebar to enter a blank space. The spacebar is used to select option fields in the Setup program.

BACK SPACE — This key moves the cursor to the left, usually erasing any characters in the cursor's path. It is also used to select option fields in the Setup program.

ENTER — This key completes keyboard entries; press Enter to complete a command or enter data for processing.

ESCAPE (ESC) — This key halts or exits a program.

FUNC — This key is used in conjunction with one of the function keys located at the top of keyboard (F2 through F12, Insert, and Delete).

ALT — Two ALT keys are provided and either key can be used in combination with one or two other keys to perform certain special functions.

CTRL — This key can be used in combination with one or two other keys to perform special functions.

CURSOR KEYS — These keys move your cursor around the screen in the direction of the arrow.

PAGE UP — This key scrolls backward through information on your screen.

PAGE DOWN — This key scrolls forward through information on your screen.

HOME — This key takes you to the beginning of the information in your file.

END — This key takes your cursor to the end of a line of text.

INSERT — This key adds new text between existing text.

DELETE — This key removes text.

Special Function Keys (Hot Keys)

Your computer has been configured with special function key combinations. These special function keys are:

Func + F2 (Battery) — This displays the current battery charge status or shows AC power connected. See "Monitoring Battery Pack Status" on page 4-19 for more information.

Note: Func + F2 should not be used when a serial port communications application or a fax/modem call is in progress.

Func + F3 (Setup) — This allows access to Power Management Setup.

Note: Func + F3 should not be used when a serial port communications application or a fax/modem call is in progress.

Func + F4 (Suspend) — This enters either Suspend or Hibernate mode (determined by the Suspend mode option in Setup).

Func + F5 (Speaker) — This toggles the speaker between enabled and disabled.

Func + F6 (System Request) — This emulates the System Request on a 3270 terminal. If 3270 terminal emulation software is used, this software converts a personal computer into a terminal for the purpose of data communications. Data communications is the transfer of information from one computer or file server to another through telephones and modems.

Func + F7 (CRT/LCD) — This allows you to select the LCD or the CRT. Read "SIMUL" on page 5-3 for more information on how to use the LCD and CRT simultaneously.

Func + F8 (Reverse/Video) — This allows you to select normal or reverse video on the LCD display.

Func + F9 (Num Lock) — This lets some of the keyboard keys work as if they were a separate 15-key keypad.

Func + F10 (Scroll Lock) — This operates with selected software applications to manage the on-screen display of text.

Func + F11 (Print Screen) — This is used to print the contents of the display screen.

Func + F12 (Hibernate) — This forces an immediate hibernation.

Func + INS (Pause) — This works with many operations to temporarily stop a process. After an application has been paused, pressing any key starts it again.

Func + DEL (Break) — This breaks out of some operations.

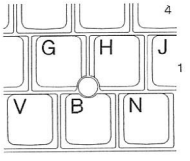
Ctrl + Alt + F3 — This accesses Setup from the DOS prompt. Use this combination to review and change system parameters, such as password, date, and time. See Chapter 2, "Setup" on page 2-1 for detailed information.

Note: Ctrl + Alt + F3 should not be used when a serial port communications application or a fax/modem call is in progress.

TrackPoint II Pointing Stick

The TrackPoint II pointing stick lets you use the full function of a mouse right under your fingertips as you type. The pointing stick is a unique cursor-pointing device that lets you use mixed type-and-point interfaces smoothly, without moving your fingers from their typing positions. There is no effort, time loss, or distraction of reaching for an extra device, and nothing extra to carry. Typing, pointing, selecting, and dragging all become part of a single process using the pointing stick-keyboard. The pointing stick can be used with either hand to control the motion of the cursor on the screen.

The pointing stick is located between the G, H, and B keys. A pair of mouse buttons positioned below the spacebar function like those on other pointing devices. The pointing stick rises only slightly above the typing keys. It detects pressure but it does *not* move. The cursor moves in the direction in which the pointing stick is pressed, at a speed that corresponds to the amount of pressure. The mouse buttons change functions depending on the software that is used. The following figure shows the location of the pointing stick.



No other software is required for the pointing stick, only the standard mouse drivers included with DOS, Windows, and OS/2.

Using the Pointing Stick

The pointing stick is easy to use. If you are new to the pointing stick, these instructions will help you get started.

1. Place your hands in the typing position, with the heels or palms of your hands resting on something solid, such as the edge of the desk. You can place either index finger on the pointing stick, just as you would place it on a key. If you are left-handed, you will probably want to use your left index finger. Your thumbs can rest comfortably above the mouse buttons.
2. Press gently in the direction that you want the cursor to move; away from you to move up the screen and toward you to move down the screen. Remember that the pointing stick is pressure sensitive and does not move.

Hint

- The secret of efficient pointing is *keep your eye on the cursor*. If you press too hard, the cursor will move too fast.
- Drive the cursor as you might drive a car, straight to your target. It is quicker to go a little slower, directly to the target. You can go faster, but then you might lose control. You will reach your target faster if you use a controllable speed.

3. Use the mouse buttons to select and drag as required by your software, just as you would with any other pointing device. You can use the thumb of the hand you use for the pointing stick, or the other one, whichever you prefer.

Cleaning the Cap

The cap on the end of the pointing stick is removable.

To maintain a smooth pointing operation, occasionally clean the cap with a soft cloth moistened with non-alkaline detergent. When the cap is worn out, replace it with a new one.

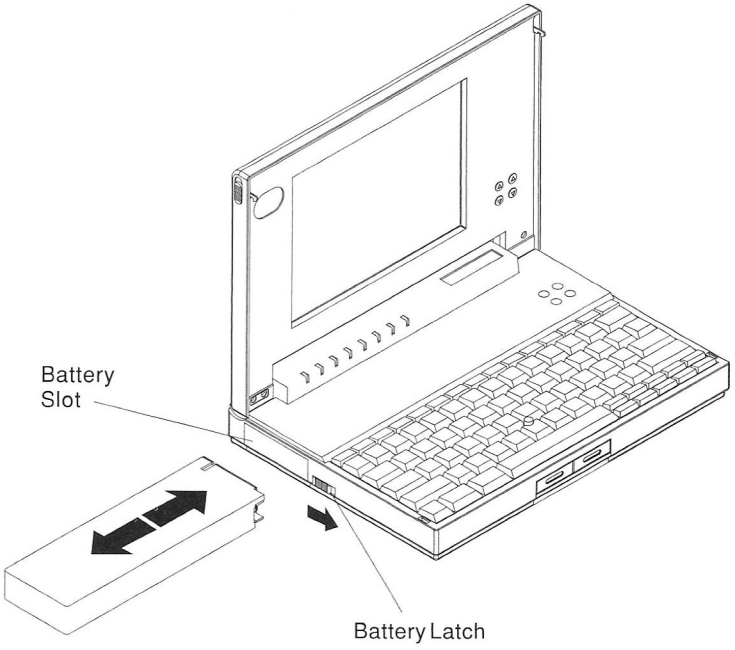
Batteries

Your computer has two types of batteries:

- A rechargeable battery pack that provides power to the computer.
- A backup battery that maintains the date, time, and configuration information in CMOS (the computer's memory).

Battery Pack

The battery pack fits into your computer as shown in the following figure.



Your computer contains special circuitry that controls the battery pack recharge rate. This feature ensures that the battery pack is not overcharged.

Monitoring Battery Pack Status

Your computer comes with an on-screen fuel gauge to conveniently monitor the remaining charge in your battery pack. To see the on-screen fuel gauge, press Func + F2.

Note: Func + F2 should not be used when a serial port communications application or a fax/modem call is in progress.

The on-screen fuel gauge displays the approximate remaining battery pack charge and one of the two following messages:

- When you are operating on AC power, with or without a battery pack installed, the following message is displayed:

```
The system is currently AC powered.

Battery Level is currently unavailable.

Hit any key to continue.
```

- When you are operating on battery pack power, the following message is displayed:

```
The System is currently Battery Powered.

Battery Level is currently High/Medium/Low.

Hit any key to continue.
```

The operating time remaining on your battery pack depends on your application, system configuration, and power management settings. (See "Conserving Battery Pack Charge" on page 4-22 for more information.)

Although you might have an hour or more of remaining battery pack life when the fuel gauge first indicates low battery pack level, connecting to AC power at this time ensures that you will have continuous power for your computer.

Low Battery Warning

The computer warns you when the battery pack is low by turning on the Low Battery indicator on the system status panel. About 1 minute after this indicator turns on, the computer enters either Suspend or Hibernate mode, according to the Setup selections.

To prevent loss of data, select the following Setup options:

Power Management:	Enabled
Suspend Mode:	Suspend/Resume
Auto Hibernate:	After 30 Minutes

With these settings, about 1 minute after the Low Battery indicator turns on, your computer automatically enters the hibernation mode and saves your data to a partition on the hard disk drive. You can then replace the battery pack or connect to AC power without losing your data.

With Power Management or Auto Hibernate disabled, your data would be lost if you could not quickly connect to AC power.

Using the AC Adapter

The AC adapter provides continuous power to the computer for normal operation. With the AC adapter connected, you can use the computer with or without a battery pack installed.

If a battery pack is installed, the AC adapter automatically charges the battery pack with the computer turned on or off.

To begin charging the battery pack, connect the computer, the AC adapter, and the power cord.

After the AC adapter is connected, the charge status indicator light comes on, indicating that the battery pack is being charged.

Warning: Use only the AC adapter that comes with your computer. Use of any other AC adapter might damage the battery pack and the computer.

The auto-switching AC adapter can be used with 110 V ac or 220 V ac.

If you turn on the computer with the AC adapter connected, after the computer has been in Suspend mode or off for an extended period of time, the following message might be displayed:

```
Real time clock failure
Time-of-day not set - run SETUP program
Invalid configuration information - please run SETUP program
Press the F1 key to continue, F2 to run the setup utility
```

This means that the battery pack and the backup battery have discharged and are unable to maintain the configuration information stored in the computer's memory.

Pressing F1 causes your computer to try to restart. Pressing F2 displays the Setup screen with a message stating the cause of the error and the action required.

Because the backup battery charges at a slow rate, leave the AC adapter connected for 24-hours to be sure the backup battery is fully recharged. Otherwise, charging is completed by using power from the main battery pack.

Warning: When you disconnect the AC adapter, pull on the connector and not on the cord. The connector locks into place and could be damaged if you pull on the cord.

Conserving Battery Pack Charge

When you operate from the battery pack, follow these guidelines to conserve battery pack charge:

- Turn down the backlight intensity
- Set a short Hard Disk Timeout (1 to 3 minutes) if your software program accesses the hard disk drive less than once every 10 minutes.
- Use the slow operating speed when your software program does not benefit from the fast speed, such as with a simple word processing program.
- Enable the Power Management functions.
- Set the Doze and Auto Suspend timers for short times (1 to 5 minutes).
- Set the serial and parallel ports to Auto mode.
- Set Diskette to Auto mode.
- Set LCD Timeout to a short period (30 seconds).

You can preserve the life of the battery pack by not allowing the battery pack to overly discharge. Charge the battery pack when the remaining charge level is low. (See "Monitoring Battery Pack Status" on page 4-19 for more information.)

Storing Your Battery Pack

If you do not plan to use your battery pack for an extended period of time, store the battery pack fully charged, under moderate temperature and humidity conditions.

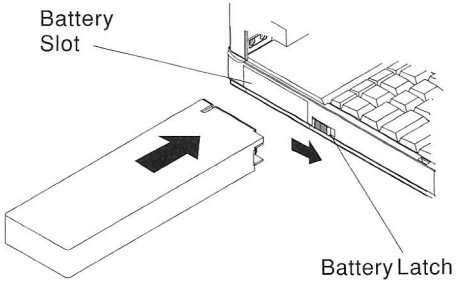
Before using a battery pack that has been stored for an extended period, charge the battery pack to ensure maximum operating time.

Replacing the Battery Pack

Replace the battery pack as described in the following steps:

1. Locate the battery pack slot as shown in the following figure.
2. Slide the spring loaded latch towards the front.
3. Remove the old battery pack from the computer.
4. Insert the new battery pack into the slot until you hear it click.

   Be sure the battery pack is securely installed in the computer.



Return your old battery pack to your place of purchase for disposal.

Backup Battery

The backup battery maintains your date, time, and configuration information when neither battery pack nor AC power is available.

When the backup battery is low, the computer prompts you to recharge it with the message:

```
Real time clock failure
Time-of-day not set - run SETUP program
Invalid configuration information - please run SETUP program
Press the F1 key to continue, F2 to run the setup utility
```

To recharge the backup battery:

1. Connect the AC adapter to the computer.
2. Connect the power cord to an AC source.

The backup battery automatically begins recharging.

If you receive the same message after charging the backup battery for 24-hours, have your computer serviced.

Chapter 5. Utilities

Your computer is configured with a number of utility programs. These programs provide added function that enhances the useability of your computer. It is recommended that you backup these programs to a diskette to prevent lose of data. You can perform the backup function by using the INTRO program provided with your computer.

The programs described in this chapter are:

- **SIMUL** — Allows you to enable/disable simultaneous display on both the LCD and CRT.

  Note: SIMUL must be run from a full screen DOS prompt. The Func + F7 function is not recognized until you have exited Simultaneous mode.

- **EPP2** — Provides Enhanced Parallel Port Utility. You only need to add this utility to your AUTOEXEC.BAT or CONFIG.SYS files if you want to use a parallel port device that supports EPP mode.

- **PHDISK** — Prepares your hard disk for the hibernation feature, including formatting and the marking of defective areas. PHDISK reserves a partition of the hard disk to save your data before entering Hibernation mode. Your computer has been configured with this feature. You need to run the PHDISK utility if you change operating environments, reformat your hard disk, or add additional memory.

  Warning: Running this utility causes loss of data on the hard disk. It is important that you back up your data prior to using this utility.

- **PCMCIA Drivers** — IBM2SS01.SYS and PCMCIA.SYS give you the ability to use PCMCIA cards in an OS/2 environment.

- **PhoenixCARD Manager Plus (PCM Plus)**** Provides maximum function and support for PCMCIA cards in a DOS or Windows environment. If you choose to change your operating environment, you need to run the UINSTALL utility in the new environment.

Syntax Notation

Use the following symbols and notations to define the command syntax presented in this chapter.

Bar | Separates mutually exclusive options. Example: A|B.

Braces { } This indicates a mandatory choice you must make from among the enclosed alternatives. Example: {A|B}. You must select A or B.

Brackets [ ] This indicates an option that you may select or omit entirely. Example: [A|B]. Your may select A or B, or neither of these.

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SIMUL

SIMUL.EXE is a DOS program that allows you to switch between simultaneous display mode and single display mode. Simultaneous display mode allows you to view the computer's screen on both the liquid crystal display (LCD) and another device plugged into the computer's VGA connector.

To use SIMUL.EXE, type SIMUL at the DOS prompt. A menu appears asking you to enter one of three options:

- Switch to simultaneous display mode.
- Switch out of simultaneous display mode.
- Exit without changing the mode.

The formal syntax for SIMUL.EXE is:

```
SIMUL [ON|OFF|/?]

"/?"    displays a help screen
"ON"    turns simultaneous mode on
"OFF"   turns simultaneous mode off
```

If any parameters are specified on the command line, SIMUL runs without displaying a menu of choices.

If the parameters are omitted, you will be given a menu of choices:

```
1.  Enter simultaneous display mode.
2.  Exit simultaneous display mode.
3.  No changes.

Select (1/2/3):
```

Note: If this utility is used with a OS/2 or Microsoft Windows, it must be run from a Full Screen DOS window. Otherwise, SIMUL displays the following message:

```
ERROR:  This program must be run from full
screen text mode.
```

When you turn the computer on, or return from hibernation, the computer uses the CRT, if it is connected. Otherwise it uses the LCD. You can use both the LCD and CRT simultaneously. To do this, run the SIMUL.EXE program using a full DOS screen. To return to a single screen, run the SIMUL.EXE program again.

Note: There may be a slight reduction in performance when using both screens simultaneously.

EPP2

EPP2.EXE is a device driver/TSR (Terminate and Stay Resident) that provides Enhanced Parallel Port capability.

Syntax

The following is the syntax for the EPP2.EXE utility.

```
CONFIG.SYS:     DEVICE = \path\EPP2.EXE
                DEVICEHIGH = d:\path\EPP2.EXE

AUTOEXEC.BAT:   EPP2

DOS SYNTAX:     EPP2
```

There are no parameters for this device driver. After it has been loaded, it may be unloaded by typing at the command line:

```
d:\path\EPP2
```

Where d:\path represents the full path to the directory containing the EPP2.EXE device driver.

You are asked if EPP2 should be removed from the computer. If you select yes, EPP2 is removed. If you select no, EPP2 is retained.

Messages

Message	Explanation
EPPv2.0 Has Already Been Installed. Do You Wish To Remove It From The System? (Y/N)	Displays if EPP2 is already resident when the EPP2.EXE is run. Respond Y to unload EPP2, N to leave it resident.
EPPv2.0 Unloaded	Displays if you reply Y to the query to remove EPP2 from the computer.
EPPv2.0 Retained	Displays if you reply N to the query to remove EPP2 from the computer.

PHDISK

Warning: Running this utility causes loss of data on the hard disk. It is important that you back up your data prior to using this utility.

Do not run this utility unless you have changed the system memory (with a DRAM option card) and you want to use hibernation. Refer to the README.DOC file for specific system requirements to run PHDISK. Do not run PHDISK if you add a PCMCIA PC card.

The PHDISK.EXE utility prepares your hard disk for the hibernation feature that includes formatting and marking of defective areas on the hard disk.

Follow these steps to run the PHDISK.EXE utility.

Note: If you are installing additional memory, complete steps 1 through 6. If you are reformatting the hard disk drive, complete steps 2 through 6.

1. Add the 88-pin memory-card upgrade.
2. Backup your hard disk drive.
3. Run the PHDISK.EXE utility.
4. Run the FDISK.EXE utility.
5. Run the FORMAT.EXE utility.
6. Restore the hard disk drive data from your backup diskettes.

Refer to your DOS manual for more information.

DOS Syntax

The following is the DOS syntax for the Hibernation Utility.

```
PHDISK/CREATE[size][/DELETE]
      /DELETE|/REFORMAT|INFO
```

This syntax shows the two basic forms for the PHDISK command line entry. The PHDISK options may be specified using only the first letter of each option. For example, both the /REFORMAT and /R commands start the reformat function.

Note: The PHDISK utility must be run before a hard disk is formatted using the FDISK utility.

If you start the PHDISK utility without using any parameters, the following information is displayed:

- Minimum amount of hard disk storage required for hibernation
- Current amount of storage available in the hard disk partition
- A short usage message

DOS Syntax Options

The following is a list of options that you can use with the syntax and their descriptions.

/CREATE[size][/DELETE] — Creates a hibernation hard disk partition. If PHDISK /CREATE is specified without other options, the PHDISK utility allocates the minimum size required to use the hibernation feature. This minimum size uses a default of 512KB for the video RAM size.

The size option of /CREATE allows you to specify a different size for the hibernation hard disk partition in kilobytes. If the specified size is less than the minimum required partition size determined by the PHDISK utility, the size is ignored and the hard disk partition is created at the minimum required size.

The /CREATE option causes the PHDISK utility to mark out any defective areas found during the format operation.

/**REFORMAT** — Reformat an existing hibernation hard disk partition. Use this option if a previous hibernation operation ended with a read or write error. This will also mark out any defective areas found during the format operation. No change in the hard disk partition size will occur.

/**DELETE** — Deletes the hibernation hard disk partition and the space is reclaimed. /DELETE can be used in conjunction with /CREATE to change the size of the hibernation partition.

/**INFO** — Displays information about the hibernation hard disk partition, including the Good Space Map (GSM) and the Implied Bad Block Table, as shown in the following figure.

```
        PHDISK 1.01 - PhoenixMISER(tm) Save to Disk Partition Utility
          (c)  Phoenix Technologies Ltd. 1992   All Rights Reserved

Suspend to disk partition information:

Partition starts at absolute sector xxxxxx (head x, cylinder x, sector x)
Partition sits: xxxxxx bytes total

   Good space map 0                          Good space map 1
   --------------------------------          --------------------------------
1. Sector 0, 2 blocks skipped                Sector 0, 2 blocks skipped
2. Sector 5, 5 blocks skipped                Sector 5, 5 blocks skipped
3. Sector 18, 6 blocks skipped               Sector 18, 6 blocks skipped
4. Sector 40, 8 blocks skipped               Sector 40, 8 blocks skipped
5. Sector 55, 11 blocks skipped              Sector 55, 11 blocks skipped
6. Sector 75, 14 blocks skipped              Sector 75, 14 blocks skipped
7. Sector 17010, end of table                Sector 17010, end of table

   Implied bad block table

   Head  Cylinder  Sector  Count
   --------------------------------          --------------------------------
     n     xxxx      xx     xx                  n     xxxx      xx     xx
     n     xxxx      xx     xx                  n     xxxx      xx     xx
```

Use the following formula to calculate the exact amount of hard disk storage that is required for the hibernation mode.

```
Required storage = physical computer RAM size
                   + video RAM size (512KB) + 1KB
```

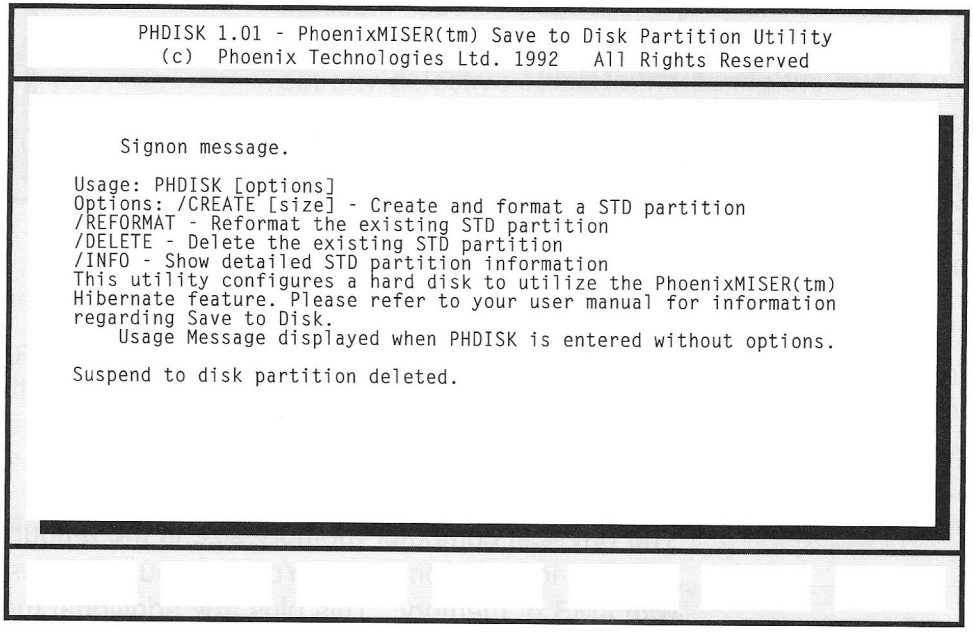
The physical computer memory size is the amount of RAM installed in your computer. Your computer comes standard with 4MB of memory. This plus any additional memory that has been added, excluding PCMCIA memory equals total installed memory.

In many cases, the amount of disk space the PHDISK utility allocates is larger than specified on the command line (or the minimum required by the above formula) because of hard disk drive requirements. This limitation is based on the partitioning scheme used by the DOS FDISK utility.

During the lifetime of a hard disk, the number of bad sectors may increase. Not accommodating for an increase in bad sectors requires an increase in the size of the hibernation hard disk partition. Using the /CREATE option without a size parameter assures that the optimal amount of disk storage is used for hibernation.

Messages

The PHDISK utility displays several information messages as shown in the following example.



The following table lists the error messages that include a recommended course of action and an explanation of why the error occurred.

Message	Explanation
Error: (User option) is an unrecognized command line option. For a command line summary, start PHDISK without any parameters.	A hard disk error occurred during any operation.
Error: A fatal hard disk error has occurred. Check your hardware configuration and restart PHDISK.	A hard disk error occurred during any operation.
Error: Not enough free disk space exists to create the hibernation partition. Refer to the user manual for possible suggestions on increasing the amount of free disk space for the hibernation partition.	The amount of free disk space to create the suspend to hard disk partition is less than the amount required to create the partition.
Error: Specified partition size is too small to use the hibernation mode. Specify a larger partition size or start the /CREATE option without a size parameter to use the default size.	Specified size for hibernation partition is too small.
Error: PhoenixMISER** suspend to hard disk partition already exists. To resize the partition, delete the existing partition with PHDISK /DELETE and create the partition with PHDISK /CREATE.	PHDISK /CREATE already used on this hard disk.
Error: Too many errors exist in the PhoenixMISER hibernation partition. Check your hardware configuration and rerun PHDISK.	Too many bad sectors in the suspend to hard disk partition.

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Message	Explanation
Error: The first two sectors in the suspend to hard disk partition are both unusable. This disk is unsuitable for the PhoenixMISER hibernation mode.	The first two sectors in the suspend to hard disk partition are bad.
Error: The PhoenixMISER hibernation partition doesn't exist or the hard disk partition table on head 0, cylinder 0, sector 1 is corrupted. Invoke PHDISK /CREATE to create the hibernation partition.	PHDISK /CREATE wasn't used on this hard disk, or the partition table on head 0, cylinder 0, sector 1 is damaged.
Error: The good sector map (GSM) in the PhoenixMISER partition is bad. Invoke PHDISK /REFORMAT to rebuild this table.	A PhoenixMISER hibernation partition exists in the hard disk partition table, but the GSM in the hibernation hard disk partition is damaged.
Error: Couldn't allocate additional memory required to run PHDISK.	Not enough memory available to run the PHDISK utility.

PCMCIA Drivers

Your computer is configured with the following PCMCIA drivers:

- IBM2SS01.SYS
- PCMCIA.SYS

These drivers give you the ability to use PCMCIA cards in an OS/2 environment.

Refer to the README.DOC file for more information on using PCMCIA drivers.

PhoenixCARD Manager Plus

The PhoenixCARD Manager Plus (PCM Plus) software is designed to provide maximum function and support for PCMCIA (Personal Computer Memory Card International Association) PC Cards while adhering to the industry standards that have been accepted by PCMCIA. Your computer has been configured with PCM Plus. This section provides a PCM Plus Basics section that allows basic and advanced users to take full advantage of the features of PCM Plus. The Advanced Features section contains detailed information that is of interest to the more advanced technically knowledgeable user. Please review the README.DOC file for the latest tips on using on PCMCIA in various operating environments.

What You Need to Know

Both the basic and advanced user can take full advantage of the many functions of PCM Plus software. To the basic user, PCM Plus will appear almost transparent. The advanced user will be able to make certain modifications to the DOS CONFIG.SYS and Microsoft Windows SYSTEM.INI files to suit specific system needs. It is important that the advanced user making these modifications be computer literate and technically knowledgeable. The advanced user should also have an understanding of the PCMCIA standards and how they apply to the PCMCIA PC Card environment.

Driver Files

Drivers are ordinarily included in either the CONFIG.SYS (DOS drivers) or SYSTEM INI (Microsoft Windows drivers files).

You can locate the DOS drivers on any drive. However, you must specify the full path for DOS drivers not located in the root directory of the hard disk drive.

Microsoft Windows drivers must reside in the Microsoft Windows /System subdirectory.

Executable Files

Both DOS and Microsoft Windows may reside on any hard disk to which the computer has access. In order for DOS to find and run a file, the .EXE or .COM file must reside in a directory specified using the PATH command, the current directory, or be run using the full path name. You can run Microsoft Windows (SYSTEM.INI) from any directory as long as you specify the full path when you run the program or when you create or define the Microsoft Windows icon.

PCM Plus Basics

This section contains the information you need to access and use the basic components and associated files of the PCM Plus software. The information in this section is compiled in such a way that it can be used by the advanced and basic user. In addition, each component of the PCM Plus software is designed for use internationally and can therefore be used in a variety of different countries.

PCM Plus Information Utilities

Status of the PC card installed in a PC socket is displayed on the computer screen during computer startup. The status information is provided by the PCM Plus Information Utilities. However, you can access PCM Plus at any time, not only during computer startup. Depending on the type of card installed, PCM Plus Information Utilities will display general utility information, as well as the status on the PC card or cards inserted. This status will indicate whether a socket is empty, or a card is inserted, and if inserted, whether the PC card is in the process of being configured. This status will also include the configuration state, card manufacturer's name, type of card (for example, FLASH, FAX/modem, SRAM), and, if the PC card has a battery installed, this information utility provides battery status. If a

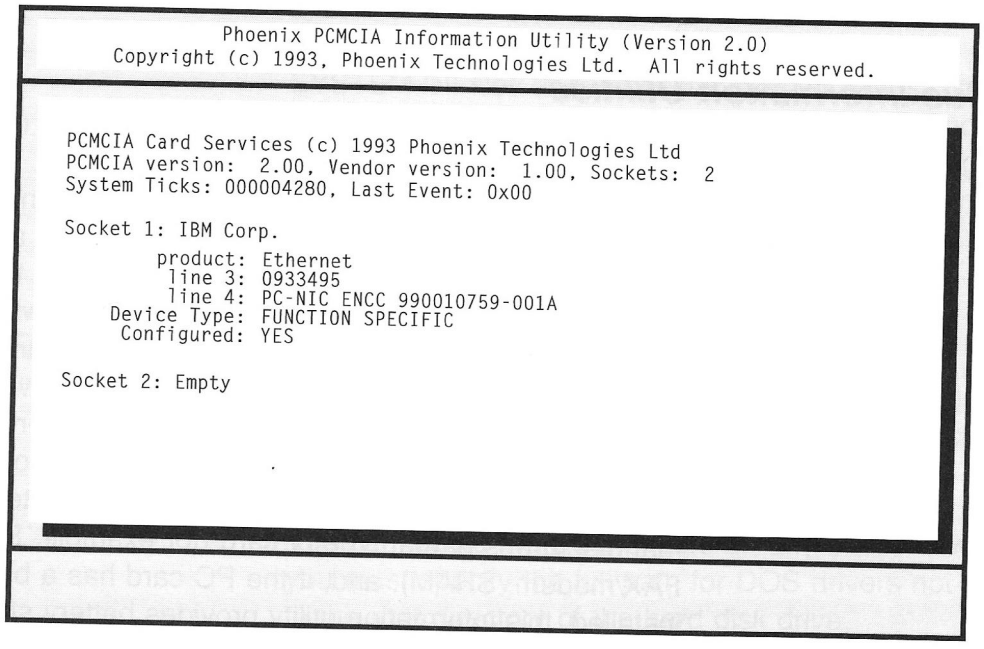
card is inserted into the socket that cannot be properly configured by PCM Plus, a message is displayed informing you of this status.

This information utility provides this status information for both the DOS and Microsoft Windows environment. In the DOS version, the status data appears on the screen whenever PCMINFO.EXE is run at the DOS prompt. In the Microsoft Windows version, the PCM Plus information utility status of the PC card is obtained by clicking on the PCMCIA icon in the Control Panel.

DOS Environment

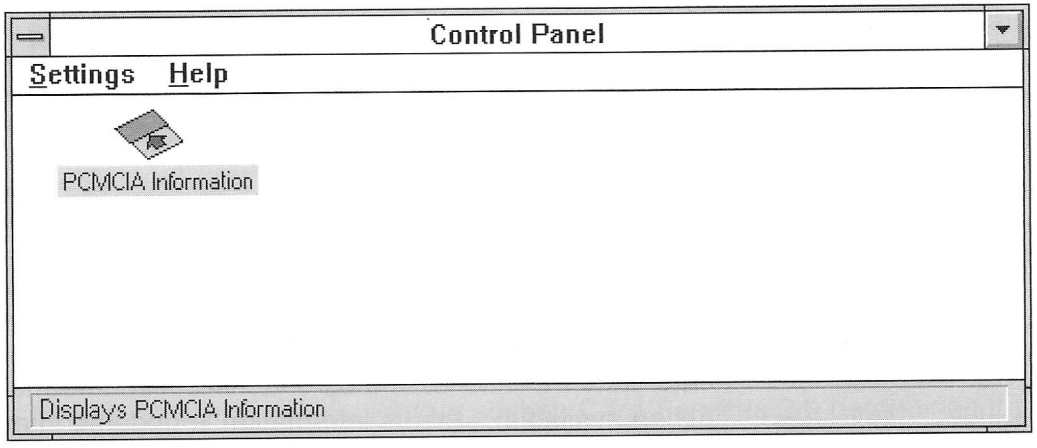
To access the information utility in the DOS environment, enter PCMINFO (PCMINFO.EXE) at the DOS prompt. PC card status is then displayed on the computer screen.

The following screen illustrates an example of the status information displayed.



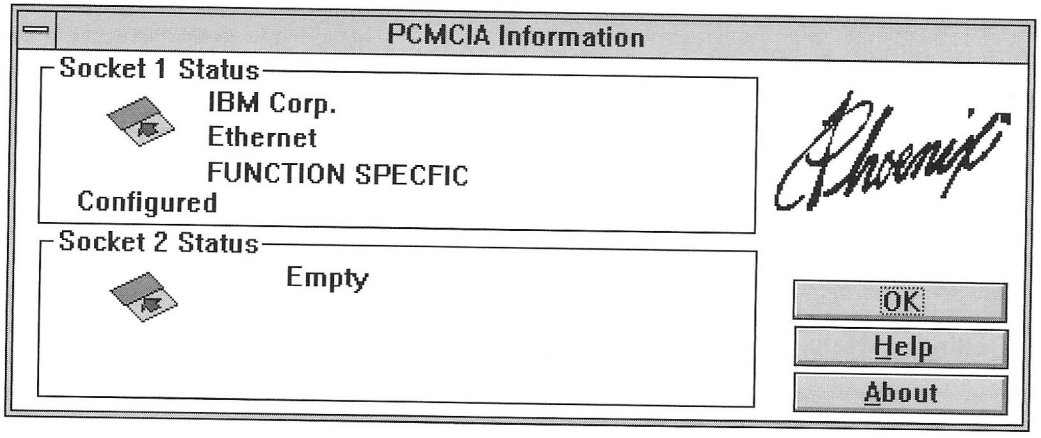
Microsoft Windows Environment

In a Windows environment, you will find a PCMCIA icon on the Microsoft Control Panel.



Clicking on the PCMCIA icon will access the PCM Plus information utility status. You can click on the PCMCIA Information icon in the Control Panel to display the Phoenix** PCMCIA Information status screen.

** Trademark of Phoenix Technologies, Ltd.



You can see that PCMCIA information utility graphically shows the card insertion and extraction activity, internal card state transitions, and card identification information (when available). Status information is updated interactively for each socket as card events occur. The program also runs as a background task.

Socket Services 2.0

The Socket Services component of the PCM Plus (PCMSS.EXE) provides the necessary software interface to the PC card socket of your computer. This is done without requiring any application program interface directly with the socket hardware. Socket Services is the lowest software layer in the PCM Plus software architecture. Socket Services was automatically loaded into your CONFIG.SYS file as a device driver. The advanced user can modify the CONFIG.SYS file for specific needs or load Socket Services as a TSR (Terminate Stay Resident) from DOS. (See "Advanced Features" on page 5-22.) PCM Plus Socket Services 2.0 complies with the PCMCIA Socket Services 2.0 Interface Specification.

Card Services 2.0

The Card Services component (PCMCS.EXE) interfaces directly with Socket Services 2.0, coordinates access to the computer, and allocates PC system resources among Card Services client drivers. A client driver is a device driver (hardware-specific software) designed to support a particular, or multiple, PC cards. Card Services 2.0 is provided as a DOS loadable driver. Card Services was automatically loaded into your CONFIG.SYS file as a device driver The advanced user can modify the CONFIG.SYS file for specific needs or load Card Services as a TSR from DOS. (See "Advanced Features" on page 5-22.)

The responsibilities of Card Services are outlined as follows:

- Complete management of all computer resources available for PC cards. When a PC card is inserted into a socket, Card Services 2.0 determines if the requested resources can be provided for that card. If the resources cannot be provided for the inserted card, and the BEEP ON option is selected (refer to "Advanced Features" on page 5-22), three beeps will sound indicating that the card cannot be configured, or resources are not available. If the default BEEP OFF is enabled, there is no beep to indicate that resources are not available or that the card is not configured.
- Managing client drivers that are written for specific PC cards. These client drivers are registered with Card Services during initialization (computer startup). Card Services then provides the registered client drivers with pertinent information when PC card events occur, such as card insertion or extraction, as well as status changes, such as battery low, card ready, and card locked.

Phoenix Super Client Driver Support

Phoenix Super Client Driver (PCMSCD.EXE) is a client driver that supports the configuration of several PC cards (see "PCM Plus PC Card Support" on page 5-35). The Super Client Driver handles the configuration of the PC card, as well as all the PC card events, mentioned in Card Services, that are associated with the socket in which the PC card is inserted. In addition, the Super Client Driver can be set up to handle power management of PC cards that support power management. For example, certain modem cards can operate in a reduced power state, conserving battery life. The Super Client Driver can also be set up to provide audible feedback for PC cards that are inserted or extracted. After configuration, the PC card operates as an integral component of the computer.

Microsoft Windows Virtual Communications Device Driver Support for FAX/Modem Cards

Due to the inherent characteristics of the Microsoft Windows Virtual Communication Driver (VCD), running in the 386 Enhanced Mode, only the FAX/modem PC card present at the time of Microsoft Windows startup is recognized. If you insert a FAX/Modem PC Card after Microsoft Windows startup you will not be able to select the FAX/modem PC card because Microsoft Windows has no record of a FAX/modem card being present at startup and therefore assumes this card is not present. This confusion in the Microsoft Windows software could result in Microsoft Windows crashing (an abnormal termination).

The PCM Plus Microsoft Windows Virtual Communications (PCMVCD.386) allows FAX/modem PC cards inserted into a PCMCIA socket, after Microsoft Windows start-up, to be fully operable under all Window sessions. The management of FAX/modem cards is accomplished with Card Services. Card Services acts as a mediator between the FAX/modem card and Microsoft Windows Kernal. Card Services generates a work-around that recognizes the

FAX/Modem card when it is inserted (after Microsoft Windows startup) in the PC card socket and creates a connection between the virtual communication port being maintained and the physical device, in this case the FAX/modem card. Microsoft Windows VCD has been replaced with the PCM Plus Microsoft Windows Virtual Communications Device Driver, and the Microsoft Windows WIN.INI file has been modified, if your system was purchased with Windows preloaded on the hard disk.

SRAM, Intel Series I and II Flash Card Support

PCM Plus supports industry standard SRAM cards, as well as Intel Series I and II Flash Cards (or compatible cards) with one integrated driver (PCMFFCS.EXE). This driver was automatically loaded into your CONFIG.SYS file. The advanced user can modify the CONFIG.SYS file for specific needs (see "Advanced Features" on page 5-22).

Logical Driver for PCMCIA ATA Fixed Disk Support

The Phoenix logical block device driver (PCMATA.SYS) provides you with the support you need when you want to use the PCMCIA socket as a logical drive for RAM and ROM PC cards, or as a PCMCIA ATA (AT Attachment) compatible fixed disk. This device driver must be loaded into CONFIG.SYS file prior to inserting a PCMCIA-ATA compatible fixed disk. Additional device driver parameters and options are defined in "Advanced Features" on page 5-22.

You can use the DOS FORMAT command to format SRAM PC Cards for read/write operations. Refer to "Advanced Features" on page 5-22 for the DOS FORMAT syntax. Using the DOS FORMAT feature will allow you to use data stored in other computers with the PCM Plus software.

Advanced Features

This section provides an in-depth look at the components and associated files of the PCM Plus software.

This section requires that the reader be computer literate and has a technical understanding of DOS and Microsoft Windows in order to be able to modify the DOS CONFIG.SYS, Microsoft Windows SYSTEM.INI, and AUTOEXEC.BAT files.

Note: Modification of the DOS and Microsoft Windows configuration and initialization files should be performed by computer literate personnel to prevent computer failures, lock-ups, and the possible loss of data. Any changes to these files should be made on a startable computer disk to verify that the changes work properly before the changes are made to your onboard CONFIG.SYS or SYSTEM.INI files.

PCM Plus Information Utilities

Two information utilities are provided with PCM Plus software. The first is PCMINFO.EXE, a DOS-based utility. The second information utility is WPCMINFO.CPL and operates under the control of Microsoft Windows Version 3.1. For a complete list of PCM Plus User Utilities, refer to "User Utilities" on page 5-36.

End User DOS Information Utility

Note: The End User DOS Information Utility only operates in a DOS environment and will not operate in a Microsoft Windows environment. For a Microsoft Windows environment, see End User Microsoft Windows Information Support below.

The End User DOS Information Utility (PCMINFO.EXE) is run in DOS and provides an array of information about each socket and any cards installed in the socket of the

computer. Executing PCMINFO displays the following options for each socket and PC Card:

- Number of sockets in the computer
- Number of sockets active (card/device installed) or inactive (card/device not installed)
- Card/Device Manufacturer's name
- Product name

  The following screen illustrates an example of the status information.

```
          Phoenix PCMCIA Information Utility (Version 2.0)
    Copyright (c) 1993, Phoenix Technologies Ltd.  All rights reserved.


PCMCIA Card Services (c) 1993 Phoenix Technologies Ltd
PCMCIA version:  2.00, Vendor version:  1.00, Sockets:  2
System Ticks: 000004280, Last Event: 0x00

Socket 1: IBM Corp.
        product: Ethernet
         line 3: 0933495
         line 4: PC-NIC ENCC 990010759-001A
    Device Type: FUNCTION SPECIFIC
     Configured: YES

Socket 2: Empty
```

- Device Type
- Whether the device is configured or not (Configuration Status)
- Last event status

Advanced Features

This section provides an in-depth look at the components and associated files of the PCM Plus software.

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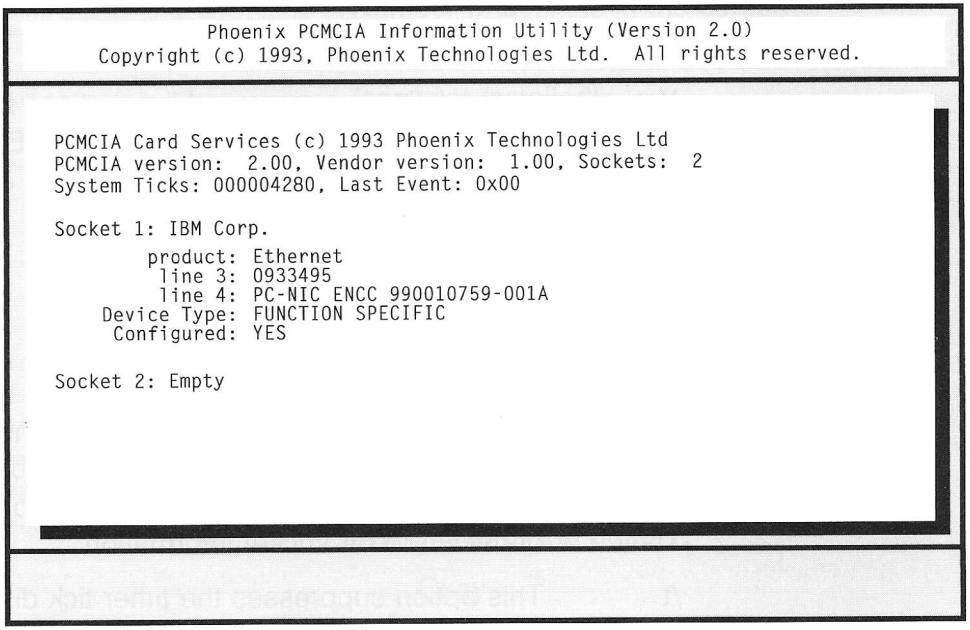
- Number of sockets in the computer
- Number of sockets active (card/device installed) or inactive (card/device not installed)
- Card/Device Manufacturer's name
- Product name

  The following screen illustrates an example of the status information.



- Device Type
- Whether the device is configured or not (Configuration Status)
- Last event status

- Card Services Vendor Version Number

For Memory Cards, the following information is displayed:

- The size of the memory on the card
- The status of the write protect switch

For SRAM and DRAM Cards, the following information is displayed:

- The status of the battery
  - Okay
  - Low
  - Dead

You can use the following command line options for the End User DOS Information Utility (PCMINFO.EXE). The command line options may be grouped together, as shown in the following example, provided each option is separated by a space.

```
/d /t /h (or /?)
```

PCMINFO {/d} or {/d /t /h}

/d This option (not case sensitive) is an interactive display mode and will continuously display the PCMINFO screen, allowing instantaneous update of the PCMCIA socket information.

/t This option suppresses the timer tick display.

/h This option, or /?, prints out what command line options are available.

End User Microsoft Windows Information Utility

The End User Microsoft Windows Information Utility (WPCMINFO.CPL) and Windows Information Utility Help (WPCMINFO.HLP) files are placed in the Microsoft Windows System directory. When you select the Control Panel icon in Microsoft Windows, a PCMCIA icon appears. Selecting this icon produces a Control Panel with the following information:

- Information about Socket 1 and Socket 2
- The Phoenix Logo and an associated help file for WPCMINFO
- Number of sockets in the computer
- Number of sockets active (card installed) or inactive (card not installed)
- Card manufacturer's name
- Product name
- Device type
- Whether the device is configured or not
- The status of the write protect switch

For SRAM and DRAM cards, the following information is displayed:

- The status of the battery:
  - Okay
  - Low
  - Dead

For an example of the Microsoft Windows Control Panel, see "Microsoft Windows Environment" on page 5-17.

Socket Services 2.0

Card Services 2.0 has been loaded as a device driver in your CONFIG.SYS file. You can modify the device driver options for Socket Services 2.0 in your CONFIG.SYS file, or load Socket Services 2.0 from the DOS prompt command line as a TSR. If you load Socket Services as a device driver, it will have the following syntax:

```
CONFIG.SYS file:  Device=path\PCMSS.EXE {Options}
```

If you load Socket Services as a TSR, it will have the following syntax:

```
DOS command line:  Path\PCMSS.EXE {Options}
```

When you load Socket Services 2.0 as a device driver, two run-time configuration options are available. Use the command line to specify run-time options. The {Options} available are:

- /RS=n_1, or n_2
- /RW=n_1, or n_2

When you use these options on the command line, a slash (/) must precede each command line option. The following sections define each option in more detail.

For more information about the functionality of Socket Services, please refer to the PCMCIA Socket Services 2.0 Interface Specification publication.

Reserve Socket

When you use the Reserve Socket option, RS=n_1, n_2, you will prevent Socket Services from colliding with other dedicated PCMCIA software that is accessing the socket hardware directly. You can also use this option to limit access to a socket that may not be accessible in the computer. The n_1 or n_2 specifies the socket number starting at zero through the number of sockets per adapter. You can only reserve a maximum of two sockets. For example:

```
PCMSS.EXE /Rs=0       reserves socket 0
```

Reserve Socket Window

When you use the Reserve Socket Window option, RW=n_1, n_2, you can reserve either I/O or Memory windows on any socket. It is necessary that you reserve either I/O and memory windows to prevent conflicts with software that are not allocating resources from Card Services. The n_1 or n_2 specifies the window number starting at zero on the first socket and continuing through the last window on the last socket. There is no distinction between I/O and Memory windows since the number and type of windows is controller specific. You can only reserve a maximum of two windows. For example:

```
PCMSS.EXE /Rw=3, 5   reserves windows 3 and 5
```

Socket Services PCMCIA ATA Support

PCMCIA ATA support is handled in Socket Services Version 2.0 by determining if the computer has been configured to start from a PCMCIA-ATA IDE drive. If this is the case, then Socket Services will treat the socket as reserved and will not use the socket or any associated hard disk resources.

Card Services 2.0

Card Services 2.0 has been loaded as a device driver in your CONFIG.SYS file with the default options. You can modify the device driver options for Card Services 2.0 with Advanced Install in your CONFIG.SYS file, or load Card Services 2.0 from the DOS prompt command line as a TSR.

If you load Card Services as a device driver, it will have the following syntax:

```
CONFIG.SYS file:   Device = path\PCMCS.EXE {Options}
```

If you load Card Services as a TSR, it will have the following syntax:

```
DOS command line:  Path\PCMCS.EXE {Options}
```

When Card Services loads as a TSR, you can use the available command line options to alter the Card Services configuration. You must precede all command line options with a forward slash (/). The command line options for Card Services are:

- /WAIT=n
- /ADDR=nn{Start Addr}
- /IRQ=n
- /CLIENTS=n :li /PMOFF
- /FLASH

For more information on the additional responsibilities and services performed by Card Service, refer to the PCMCIA Card Services 2.0 Interface Specification publication.

WAIT=n — Card Insert Settle Time

The Wait parameter is a value specified in computer timer ticks (18.2 per second) that determines the delay time needed from the time you insert a PC card and the power is applied, until the time that Card Services attempts to read the Card Information Structure (CIS) from the PC

Card. Because some PC Cards have proven to be unreliable during short settle times, this delay has become a command line option.

```
Default value:  /WAIT=12  The range for /WAIT=
                          is 1 to 100.
```

ADDR={Start Addr} — PC Card Configuration Address

This command line option defines the starting segment address for Card Services for PC card configuration. You must locate the segment {Start Address} within the first 1MB address space and must specify the start address of a 2 digit hexadecimal segment address. The granularity of {Start Address} is dependent on the socket controller; however, the minimum address granularity allowed is 4KB.

```
Default Value: /ADDR=nn (The first available 4KB block
               starting at hexadecimal segment address
               C0.)  The range for /ADDR= is C0 to F0.
```

IRQ=n — Card Services IRQ Number: This command line option defines the IRQ resource that Card Services uses for PC Card events. When you insert a PC Card, this command line option generates an interrupt. This is an example of a PC Card event. The values for IRQ can be in the decimal range of 8 through 15.

```
Default Value:   PCMIRQ=10
```

CLIENTS=n — Maximum Supported Client Drivers: This option controls the maximum number of client drivers that can register with Card Services. Each client driver requires Card Services to allocate 60 bytes of memory.

```
Default Value:   CLIENTS=10
```

PMOFF — Power Management Option: This option controls the power management provided with Card Services. If this option (/PMOFF) is specified, then PC cards are unilaterally powered-down on SUSPEND messages, and on RESUME messages the PC cards are powered-up and

reconfigured (if there is an associated client driver) by sending an artificial message.

FLASH — Flash File Computer Compatibility: This command line option must be used to make the Phoenix Flash File computer drivers (PCMFFSC.EXE) compatible.

Phoenix Super Client Driver Services Support

The Phoenix Super Client Driver services consist of a collection of client drivers designed to perform PCMCIA PC card configuration only. These client drivers are linked together to produce one driver that is loaded into memory during computer initialization.

A Phoenix Super Client Driver can consist of as few as one single client driver to a collection of drivers that includes every PC card supported by PCM Plus (refer to "PCM Plus PC Card Support" on page 5-35).

Super Client Driver Installation

The Super Client Driver has been loaded as a device driver in your CONFIG.SYS file with the BEEP ON default option. You can modify the options for the Super Client Driver in your CONFIG.SYS or load the Super Client Driver as a TSR from the DOS prompt command line

Note: You must load the Super Client Driver after Card Services.

You can load the Super Client Driver as follows:

```
CONFIG.SYS file:  Device=c:\path\PCMSCD.EXE {Options}
DOS command line (TSR):  Path\PCMSCD.EXE {Options}
```

BEEP — Audible Configuration Acknowledgment

If you disable the Beep option (BEEP OFF), no beeps are audible during PC Card insertion, removal or if the card is non-configurable. If you enable the BEEP option (BEEP ON) in the Super Client Driver CONFIG.SYS file or as a TSR, one audible beep tone is issued when a card is

inserted, recognized, and configured. When the PC card is removed from the socket a two-beep tone is issued. A three-beep sequence is issued if a PC card is not recognized, or is not able to be configured by Super Client Driver.

```
Default value:   BEEP OFF
```

To turn BEEP ON, see the following /BEEP option.

Super Client Driver Options

You can use command line switches to determine the Super Client Driver Options you want. Precede all command line options with a forward slash (/). When you load the Super Client Driver, the following command line options are available:

/? This option prints out a Help Screen (no installation[1]).

/BEEP This option turns BEEP ON (see above).

/CARDS This option prints out a list of supported cards (no installation[1]).

/COM=d This option specifies a Communication port. d is the number of the port 1, 2, 3, or 4 (4 is the default).

/RS=d This option specifies the IBM Token Ring Speed. d is 4 or 16 (4 is the default).

Microsoft Windows Virtual Communications Device Driver Support for FAX/Modem Cards

The PCM Plus Microsoft Windows Virtual Communications Driver (PCMVCD.386) is installed with a default of COM1 for the communication port. This communication port can be changed if COM1 is not appropriate.

---

1 This option displays data and then returns to DOS without installing the data into memory

SRAM, Intel Series I and II Flash Card Support

PCM Plus supports industry standard SRAM cards, as well as Intel Series I and II Flash Cards (or compatible cards) with one integrated driver (PCMFFCS.EXE). This driver has been automatically loaded into your CONFIG.SYS file. As an advanced user, you can modify the CONFIG.SYS file for specific needs.

```
device=[drive:][path]PCMFFCS.EXE
/BASE=D0 /SIZE=4 /PART=1 /QUEUE=1
```

Modifications are:

```
Device=[drive:][path]PCMFFCS.EXE [/BASE=4k
window base address] [/SIZE=4K window size]
[/RFA] [/PART=maximum # of partitions] [/QUEUE=max concurrent erases]

/BASE=  Specifies the 4K base address of the memory
        mapped window
/SIZE=  Specifies the 4K window size
/RFA    Indicates the presence of a Resident Flash Array
/PART=  Specifies the maximum number of partitions per card
/QUEUE= Specifies the number of concurrent erasures for
        cards that support background erasure (1-9)
```

Logical Driver for PCMCIA ATA Fixed Disk Support

The Phoenix logical drive block device driver (PCMATA.SYS) registers as a bulk memory client to Card Services. For access to the PCMCIA ATA IDE fixed disks, PCMATA.SYS talks directly to the IDE interface to read and write data. For PCMATA.SYS to function properly, all PCMATA ATA IDE disks must be recognized and properly configured by Card Services.

PCMATA.SYS is loaded as a device driver in the CONFIG.SYS file as follows:

```
Device=path\PCMATA.SYS {/ADDR=nn} {socket /n, or /n/n}
Socket 0 or socket 1  (/0, /1 or /0/1)
Default is: /0
```

After you load the logical driver, you can use the following devices if they are formatted with a FAT compatible disk structure:

- PCMCIA ATA IDE fixed disks that have been properly configured at the alternate hard disk address by PhoenixCARD Services.
- PCMCIA 1.0/2.0 compliant SRAM PC card (Read/Write).
- PCMCIA 1.0/2.0 compliant OTP, Mask ROM, EEPROM, or Flash card (Read Only).

Using the DOS FORMAT Command

PCMATA.SYS allows you to format PC cards using the DOS FORMAT command. Use the following syntax with the FORMAT command. d is the drive letter assigned to the socket by DOS.

For SRAM Cards

Size	Syntax
256KB	FORMAT d:/U/T:32/N:8
512KB	FORMAT d:/U/T:64/N:8
1MB	FORMAT d:/U/T:128/N:8
2MB	FORMAT d:/U/T:256/N:8

For IDE hard-disk drives, you use the same command; however, the parameters should correspond to the size of the drive. The parameters are:

```
/U      Perform unconditional format
/T:n    n represents the number of cylinders on the
        IDE Disk
/N:17   Represents 17 sectors per track
```

The following is an example using the FORMAT command to format an IDE Disk with 600 cylinders and 17 sectors per track:

```
FORMAT F:/U/T:600/N:17
```

Diskette Drive A:/B: Emulation

Diskette drive emulation (PCMFDD.EXE) is automatically loaded into your CONFIG.SYS file as:

```
Device=path\PCMFDD.EXE
```

As an advanced user, you can modify the CONFIG.SYS file for specific needs. The following is the syntax for loading PCMFDD.EXE:

```
Device=path\PCMFDD.EXE {/ADDR=nn}{x:n}
       x=emulated drive letter (A: or B:)
       n=socket number (0 or 1)
```

Drives A and/or B may be assigned, as may both sockets.

Diskette drive emulation can be also be loaded as a TSR from the DOS command line as follows:

```
Path\PCMFDD.EXE {/ADDR=nn}{x:n}
```

PCM Plus PC Card Support

The following table lists the PCMCIA PC cards currently supported by PCM Plus.

VENDOR	CARD TYPE	DESCRIPTION
AMD	FLASH	FLASH memory card 1MB, 2MB, and 4MB
AT&T Paradyne	Modem	Keepin Touch Modem Card
Hewlett Packard	Kittyhawk	20MB disk drive
Hitachi	SRAM	1MB with 512KB EEPROM
IBM	LAN	Token Ring LAN card
IBM	LAN	Ethernet LAN card
IBM	Flash	4MB FLASH card, Series I compatible
IBM	SRAM	2MB SRAM
Intel	Modem	2400 bps
Intel	FAX/Modem	9600 bps
Intel	FLASH	Series II FLASH (1MB, 4MB)
Intel	FLASH	Series I FLASH (1MB)
Megahertz	FAX/Modem	FAX/Modem
OmniTel	Modem	FAX/data Modem card
PNB	Modem	V.22 BIS Modem card
PNB	Modem	V.32/V.42 BIS Rio Grande Modem card
SunDISK	IDE drive	2.5, 10, and 20 MB IDE drives
TDK	FAX/Modem	DF2496A Data FAX Modem card
Seiko Epson	SRAM	SRAM IC Memory card (256KB, 512KB)
XIRCOM	LAN	LAN card
Socket Communi-cations	LAN	Ethernet LAN card

User Utilities

The following is a brief overview of the PCMCIA PCM Plus utilities.

PCFORMAT.EXE Memory Card Utility — A utility to format a PCMCIA static memory card of any size for DOS FAT file system drivers.

PCMINFO.COM PCMCIA Utility — Provides a means to view slot and card information and status in a DOS environment.

WPCMINFO.CPL PCMCIA Utility — Provides a means to view slot and card information and status in a Windows environment.

Appendix A. Specifications

Computer Dimensions

Width	256.7 mm (10.11 in.)
Depth	183.7 mm (7.23 in.)
Height (top cover closed)	41.4 mm (1.63 in.)
Weight	1.67 kg (3.7 lb.) with 85MB hard disk and battery pack

Environment

Temperature

Operating	5° to 40°C (41° to 104°F)
Non-operating	-31° to 60°C (-25° to 140°F)

Humidity

Operating/Non-operating	8% to 80% relative humidity (non-condensing)

Altitude (unpressurized)

Operating/Non-operating	0 to 3,000 meters (0 feet to 10,000 feet)

Electrical (AC Adapter)

Sine wave input, 48 to 64 Hz required
110-240 V ac

Battery Pack

Output Voltage	+10.8 V dc nominal
Current	1700 mAH

LCD Display

The LCD display is a 640 x 480 pixel black and white transmissive LCD with backlight. It supports 64 shades of grey.

Screen size	188 mm (7.4 in.)
Display area (W x H)	146 mm x 110 mm (5.75 x 4.33 in.)
Display pixels	640 x 480
Pixel pitch (W x H)	0.23 mm x 0.23 mm
Contrast ratio	18:1

External Display

The external display requires an adapter cable. The adapter cable is included with your computer.

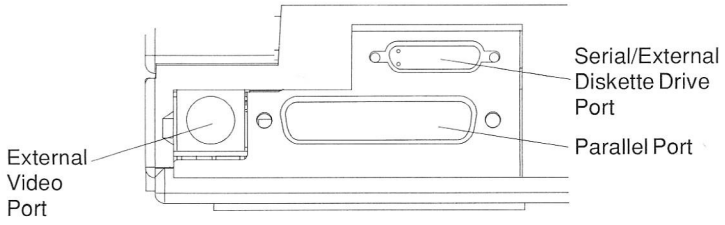
Horizontal Scan	31.49 kHz
Vertical Scan	70 Hz — standard video modes 56 Hz — extended video modes
Resolution	Up to 800 x 600 pixels with appropriate driver software
Signal Type	Analog RGB, 0 to 0.714 V; 75 ohm impedance (0 volts represents black)

You can use the LCD or a CRT by using Func + F7. Read about using Func + F7 in "Special Function Keys (Hot Keys)" on page 4-13 for more information. Also, to use both the LCD and CRT at the same time, read "SIMUL" on page 5-3.

Input/Output

These ports, along with the unique adapter cables included with your computer, provide connectivity to a variety of peripheral devices including the diskette drive.

The pin descriptions for the serial, parallel, and external video connectors are shown on the following pages. The pin information for the video port, serial port, external diskette drive port, and the external diskette drive connector is not included since these items are unique to this computer. The location of the ports and connectors is shown in the following figure.



In addition to the ports, a slot is provided for PCMCIA cards.

Serial

An RS-232C asynchronous serial port is provided through a dual adapter cable that comes with your computer.

- Configured as COM1
- Supports baud rates of 50 to 19,200
- Selectable protocols
- Male 9-pin connector

Serial Connector Pin Descriptions

PIN	SIGNAL	PIN	SIGNAL
1	Carrier detect (CD)	6	Data set ready (DSR)
2	Receive data (RXD)	7	Request to send (RTS)
3	Transmit data (TXD)	8	Clear to send (CTS)
4	Data terminal ready (DTR)	9	Ring indicator (RI)
5	Ground		

Parallel

- One Centronics**-type or bi-directional enhanced parallel port.
- Configured as LPT1.
- Female 25-pin connector.
- Can be used as a high-speed bidirectional port.
- Can be used in EPP mode through the utility program EPP2.EXE. See Chapter 5, "Utilities" on page 5-1 for more information.
- Can be configured as AT or PS/2 compatible through Setup.

Parallel Connector Pin Descriptions

PIN	STANDARD MODE	HIGH-PERFORMANCE MODE (EPP)
1	Data strobe (STROBE)	Write strobe (WRITE)
2 – 9	Data bits 0 – 7 (D0 – D7)	Data bits 0 – 7 (D0 – D7)
10	Acknowledge (ACK)	Interrupt (INTR)
11	Printer busy (BUSY)	Insert wait states (WAIT)
12	Paper out (PE)	Not available
13	Printer select acknowledge (SLCT)	Device select acknowledge (SLCT)
14	Auto line feed (AUTOFDXT)	Data strobe (DSTRB)
15	Printer error (ERROR)	Device error (ERROR)
16	Initialize (INIT)	Reset device (INIT)
17	Select input (SLCTIN)	Address strobe (ADSTRB)
18 – 25	Ground (GND)	Ground (GND)

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External Video Connector Pin Descriptions

The External Video Connector is provided through the video adapter cable.

PIN	SIGNAL	PIN	SIGNAL
1	Red analog video output	9	No pin in connector
2	Green analog video output	10	Ground
3	Blue analog video output	11	Not connected
4	Not connected	12	Not connected
5	Ground	13	Horizontal sync control
6	Red Ground	14	Vertical sync control
7	Green Ground	15	Not connected
8	Blue Ground		

Appendix B. Troubleshooting

There are three types of error messages:

- POST Error Messages
- Informational Messages
- Run Time Messages

POST Error Messages

Message	Possible Cause	Action
Diskette read failure — press F1 to retry boot (or may also say, Press F1 to retry boot, F2 for SETUP utility)	The diskette is either not formatted or is defective.	Replace the diskette with a startable diskette and retry.
Gate A20 failure	The keyboard controller is not accepting commands.	Turn the power off, then back on again. If the problem persists, have your computer serviced.
Hard disk configuration error	The specified configuration is not supported or does not match the actual hardware installed.	Correct the hard disk configuration. Refer to "Disk Drives" on page 4-5.
Hard disk controller failure	The controller has failed.	Have your computer serviced.
Hard disk failure	The hard disk might be defective.	Try restarting the computer. If that does not work, have your computer serviced.
Hard disk read failure — press F1 to retry boot (or may also say, Press F1 to retry boot, F2 for SETUP utility)	The hard disk may be configured incorrectly or is defective.	Check the drive type selected in Setup. Try restarting the computer. If that does not work, have your computer serviced.

Message	Possible Cause	Action
Pointer device failure	The pointing device (TrackPoint II) has failed.	Try restarting the computer. If problem persists, have your computer serviced.
No boot device available — press F1 to retry boot (or may also say, Press F1 to retry boot, F2 for SETUP utility)	Either diskette A, the hard disk, or both, are defective.	Try restarting the computer. If problem persists, have your computer serviced.
No boot sector on hard disk — press F1 to retry boot (or may also say, Press F1 to retry boot, F2 for SETUP utility)	The C: drive is not formatted or is not startable.	Format the C: drive using the DOS command, **FORMAT C: /S**, to transfer the computer files to the hard disk.
Not a boot diskette — press F1 to retry boot (or may also say, Press F1 to retry boot, F2 for SETUP utility)	The diskette in drive A: is not formatted as a startable diskette.	Replace the diskette with a startable diskette and try restarting.
No timer tick interrupt	The timer chip has failed.	Turn the power off, then back on again. If the problem persists, have your computer serviced.
ROM bad checksum	The Flash part (or EPROM) has been corrupted.	Have your computer serviced.
Shutdown failure	Either the keyboard controller is not accepting the reset command or the associated reset logic has failed.	Turn the power off, then back on again. If the problem persists, have your computer serviced.
Time of day not set — run SETUP program	Clock not set or backup battery failed.	Run the Setup utility or you may need to charge the backup battery.
Timer 2 failed	The timer chip has failed.	Turn the power off, then back on again. If the problem persists, have your computer serviced.

Message	Possible Cause	Action
Invalid configuration information — please run SETUP	Configuration error or backup battery failed.	Run the Setup utility and check configuration settings, or you may need to charge the backup battery.
Keyboard data line failure	The keyboard controller has failed.	Turn the power off, then back on again. If the problem persists, have your computer serviced.
Keyboard controller failure	The keyboard controller has failed.	Turn the power off, then back on again. If the problem persists, have your computer serviced.
Keyboard stuck key failure	A key was pressed during startup.	Do not press a key during startup. Turn the power off, then back on again. If the problem persists, have your computer serviced.
Memory failure at hex-value, read hex-value, expecting hex-value	Circuitry associated with the memory chips has failed.	Turn the power off, then back on again. If the problem persists, have your computer serviced.
Unexpected interrupt in protected mode	Hardware interrupt or NMI occurred while in protected mode.	Have your computer serviced.
Real-time clock failure	The RTC or backup battery failed.	Run Setup utility and turn the power off, then back on again, or you may need to charge the backup battery. If the problem persists, have your computer serviced.

Informational Messages

Message	Meaning
nnnK Base Memory	The amount of base memory that tested successfully.
nnnK Extended	The amount of extended memory that tested successfully.
Memory tests terminated by keystroke	This message indicates that the spacebar was pressed while the memory tests were running and stopped the memory tests.
Press the F1 key to continue	An error was found during POST. Pressing F1 allows the computer to attempt to start.
Beginning memory test. Press the spacebar to terminate the memory test.	Pressing the spacebar stops the memory test.
Press the F1 key to continue, F2 to run the SETUP utility	Pressing F1 allows the computer to attempt to start. Pressing F2 allows you to run the ROM-based SETUP utility to correct configuration information.

Run Time Messages

Message	Possible Cause	Action
Memory parity interrupt at address. Type (S)hut off NMI, (R)eboot, other keys to continue.	At least one memory chip has failed.	Have your computer serviced.
Unexpected HW interrupt at address. Type (R)eboot, other keys to continue.	Hardware problem. This message not displayed if the extended interrupt handler is not enabled.	Try restarting the computer. If that does not work, have your computer serviced.
Unexpected SW interrupt at address. Type (R)eboot, other keys to continue.	Error(s) in the software program. Not displayed if the extended interrupt handler is not enabled.	Try restarting the computer. If that does not work, have your computer serviced.
Unexpected type 02 interrupt at xxxxxh. Type (S)hut off NMI, (R)eboot, other keys to continue.	A parity error occurred, but the source cannot be determined.	Try restarting the computer. If that does not work, have your computer serviced.

Appendix C. Product Warranties and Notices

This appendix contains the product warranties and notices associated with your IBM ThinkPad 500.

Product Warranties

International Business Machines Corporation Armonk, New York, 10504

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty applies only to Machines you originally purchase for your use, and not for resale, from IBM or an IBM authorized reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Machines are subject to these terms only if purchased in the United States or Puerto Rico, or Canada, and located in the country of purchase. If you have any questions, contact IBM or your reseller.

Notice

Machine: IBM THINKPAD 500

Warranty Period: ONE YEAR

Elements and accessories are warranted for three months. Contact your place of Purchase for warranty service information.

Production Status

Each Machine is manufactured from new parts.

The IBM Warranty

IBM warrants that each Machine I) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the war-

ranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period, IBM or your reseller will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine. IBM or your reseller will specify the type of service.

For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering–change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net–Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

Replacement parts assume the remaining warranty of the parts they replace.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it without charge. If IBM or your reseller is unable to do so, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1–800–1BM–SERV (426–7378)**. In Canada, call IBM at **1–800–465–6666**. You may be required to present proof of purchase.

Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order.

It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine,
   c. inform IBM or your reseller of changes in a Machine's location, and
   d. for a Machine with exchange service, remove all features, parts, options, alterations. and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

Extent of Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible may void the warranties.

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1. bodily injury (including death), and damage to real property and tangible personal property; and
2. the amount of any other actual loss or damage, up to the greater of $100,000 or the charge for the Machine that is the subject of the claim.

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2. loss of, or damage to, your records or data; or
3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM is informed of their possibility.

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OS/2	PS/2
ThinkPad	TrackPoint II

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Microsoft	Trademark of Microsoft Corporation
Microsoft Windows	Trademark of Microsoft Corporation
Phoenix	Trademark of Phoenix Technologies, Ltd.
PhoenixCARD Manager Plus (PCM Plus)	Trademark of Phoenix Technologies, Ltd.
PhoenixMISER	Trademark of Phoenix Technologies, Ltd.

Electronics Emission Notices: Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device. pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications compliance statement

This equipment does not exceed Class B limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

Glossary

80486SLC2. IBM microprocessor containing built-in power management circuitry.

A

AC. (Alternating Current) The type of current available in wall outlets. All computers must convert alternating current to direct current to operate. *See also* DC.

AC adapter. The power supply for portable computers that converts AC to the DC required by the computer. *See also* AC and DC.

AT. (Advanced Technology). *See also* ISA.

B

backup. A copy of data for safe-keeping. The data is copied from computer memory or disk to a diskette, magnetic tape, or other media.

backup battery. The battery in your computer that maintains the real-time clock and the configuration information when the computer's power is removed.

base memory. An area of memory between 0 and 640 kilobytes.

battery pack. The main group of batteries used to power a portable computer.

baud rate. The speed with which data is transmitted during serial communication. The computer's operating system and software program must be configured for the same baud rate as the communication device, such as a serial printer. *See also* bps.

BIOS. (Basic Input/Output System) A program stored in flash EPROM, EPROM, or ROM that controls the keyboard, disk drives, video display, and other devices. *See also* flash EPROM, EPROM, and ROM.

bit. Derived from BInary digiT, a bit is the smallest unit of information a computer handles. *See also* byte.

boot. The process of loading the operating system into memory.

bps. (bits per second) The number of bits transferred in one second during serial communication, such as modem transmission.

byte. A group of eight bits.

C

cache memory. A very fast, limited portion of RAM set aside for temporary storage of data for direct access by the microprocessor.

CMOS. (Complimentary Metal-Oxide Semiconductor) A type of low-power integrated circuits used in computers. *See also* TTL.

COM1 or COM2. The name you can assign a serial port to set or change its address. *See also* serial port.

command. An instruction that directs the computer to perform a particular operation.

configuration. The way in which a computer is set up to operate. Some configurable options include CPU speed, serial port designation, and memory allocation.

CPU. (Central Processing Unit) See microprocessor.

CRT. (Cathode-Ray Tube) The type of video display used in displays for desktop computers.

D

DC. (Direct Current) The type of current available in the rechargeable battery packs used in portable computers. *See also* AC.

default. The factory setting your computer uses unless you instruct it otherwise. For example, when powering up, the computer will start from the default drive. Default settings can be changed using the Setup program.

device driver. A software program that a computer must use to recognize and operate certain hardware, such as a mouse or a video display.

disk drive. A device that stores data on a hard drive or diskette. A diskette drive requires a diskette to be inserted; a hard drive has a permanently encased hard disk.

DOS. (Disk Operating System) See operating system.

DRAM. (Dynamic RAM). *See also* RAM

E

ECU. (EISA Configuration Utility) The program that you use to change the configuration of an EISA computer.

EPROM. (Erasable Programmable Read-Only Memory) A type of memory device that is usually used to store system BIOS code. This code can be erased with ultraviolet light, but is not lost when the computer is powered off. *See also* flash EPROM and ROM.

extended memory. The protected memory above 1M that is directly accessible by the microprocessor through certain utilities and operating systems. This memory is used in computers with 80286, 80386, and 80486 microprocessors.

F

flash EPROM. A type of memory device that is usually used to store system BIOS code. This code can be replaced with updated code from a diskette, and is not lost when the computer is powered off. *See also* EPROM and ROM.

format. The process used to organize a hard drive or diskette into sectors so it can accept data. Formatting destroys all previous data on the disk.

G

GB. (Gigabyte) 1,073,741,824 bytes. *See also* byte.

H

hard disk drive. *See* disk drive.

hardware. The physical parts of your computer, including the keyboard, display, disk drives, cables, and circuit cards.

hibernate. Hibernate mode is used for longer pauses in battery operation and can be considered an alternative to traditional On/Off mode. Hibernate saves all data to the hard disk drive and the computer is shut off. You are re-entered at the same point when the computer is returned to normal operation.

I

IC. (Integrated Circuit) A computer chip.

Icon. A small graphic depiction of an object. Icons can represent a series of functions or programs.

ICU. (ISA Configuration Utility) The program that you use to change the configuration of an ISA computer.

IDE. (Integrated Drive Electronics) A type of hard disk drive with the control circuitry located inside the disk drive rather than on a drive controller card.

interface. A connection between the computer and a peripheral device that enables them to exchange data. *See also* parallel port and serial port.

ISA. (Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 16 bits of data at a time.

J

jumper. A small electrical connector used for configuration on some computer hardware.

K

KB. (Kilobyte) 1,024 bytes. *See also* byte.

L

LAN. (Local Area Network) A group of computers linked together within a limited area to exchange information.

LCD. (Liquid Crystal Display) The type of video display used in portable computers.

LED. (Light-Emitting Diode) A small electronic device that glows when current is applied to it.

LPT1 or LPT2. The name you can assign a parallel port to specify its address. *See also* parallel port.

M

MB. (Megabyte) 1,048,576 bytes. *See also* byte, extended memory, RAM, and ROM.

memory. The place in your computer that stores data and programs. *See also* extended memory, RAM, and ROM.

microprocessor. The integrated circuit that processes data and controls the basic functions of the computer.

modem. A device used to exchange information with other computers over telephone or data lines.

module. A circuit board that plugs into a dedicated connector on the system board in your computer.

mouse. A small input device that allows you to control the cursor movement and operation of the computer when using certain software programs.

N

NVRAM. (Nonvolatile RAM) A type of RAM that retains its contents even after the computer is powered off. This memory stores EISA configuration information. *See also* RAM and SRAM.

O

operating system. A set of programs that provides the interface between other software programs and the computer.

P

parallel communication. Information transmitted in parallel signals, eight or more bits at a time.

parallel port. The connector on the back of your computer that allows the transfer of data between the computer and a parallel device, such as a parallel printer.

partition. The process of dividing the storage space on a hard disk into separate areas so that the operating system treats them as separate disk drives.

password. A security feature that prevents an unauthorized user from operating your computer. *See also* EPROM.

PCMCIA. Personal Computer Memory Card International Association. A trade association of leading hardware and software vendors, established to adopt a set of standards pertaining to adapter slots and PC cards for portable PC accessories.

peripheral. A device connected to and controlled by the computer, such as an external disk drive or a printer.

pixel. The smallest element (dot) that is visible on a video display. The resolution of a video display system is measured in pixels.

pointing stick. Unique cursor-pointing device that lets you used mixed type-and-point interface smoothly, without moving your fingers from their typing positions. The pointing stick is located between the G, H, and B keys.

POST. Power-On Self Test, including power-on diagnostics.

Power Management. Power Management reduces system power and increases the life of the battery. Power Management is initiated through the Power Management Setup function.

R

RAM. (Random-Access Memory) A temporary storage area for data and programs. This type of memory must be periodically refreshed to maintain valid data, and is lost when the computer is powered off. *See also* NVRAM and SRAM.

real-time clock. The IC in your computer that maintains the time and date.

RGB or RGBI. (Red, Green, Blue, Intensity) Separate video signals used to produce different

colors for color displays and different shades of one color for monochrome displays. The addition of the intensity signal allows twice as many colors or shades to be displayed.

ROM. (Read-Only Memory) A type of memory device that usually is used to store system BIOS code. This code cannot be altered and is not lost when the computer is powered off. *See also* BIOS, EPROM, and flash EPROM.

RS-232C port. An industry standard serial port. *See also* serial port.

S

save. To store information on a diskette, hard disk, magnetic tape, or some other permanent storage device.

SCSI. (Small Computer System Interface) An industry standard interface that provides high-speed access to tape drives, hard disk drives, and other peripheral devices.

serial communication. Information sent sequentially, one bit at a time.

serial port. The connector on the back of your computer that allows the transfer of data between the computer and a serial device, such as a mouse, a modem, or a serial printer.

Setup program. A program located in a portable computer's ROM that contains information about the hardware in the computer and how it is used.

software. Programs with specific functions, such as word processing, data base management, and communications.

SVGA. (Super VGA) A type of video display system that provides very high-resolution text and graphics on analog color displays.

system board. The main circuit board in your computer. It contains most of the connectors and ports.

T

tape drive. A type of storage device using magnetic tape.

TrackPoint II. Integrated pointing device located between the G, H, and B keys, and a pair of click buttons positioned below the spacebar.

TSR. Terminate and Stay Resident. TSR is a DOS program. A pop-up program that is loaded into memory (RAM) and remains invisible and inactive until it is called by a certain event (key stroke or command message).

TTL. (Transistor-Transistor Logic) A type of integrated circuit used in computers. *See also* CMOS.

V

VGA. (Video Graphics Array) A type of video display that provides high-resolution text and graphics video modes on analog color displays.

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